Course Type	rrse pe Course Code Name of Course		L	Т	Р	Credit
DP	NCYC504	Instrumental Method of Analysis Lab	0	0	3	1.5

Course Objective						
٠	The purpose of this course is to provide in-depth practical training in laboratory techniques with a					
	diverse toolbox in analytical sciences and instrumentation.					

• Also it will enhance student-centered activity and inquiry-based learning to strengthen the connections to real-life.

Learning Outcomes

- Students gain hands-on practical experience with a range of equipment in the field of analytical sciences which can intensify the fundamental understanding of instruments and its background theory.
- Students should able to apply the analytical instruments confidently and accurately in order to address their needs.

Uni t No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction to different Analytical Techniques and Instruments.	3	Basics of the different experiments and laboratory etiquettes will be discussed with the students.
2	IR spectrophotometry: Sample preparation for liquid and solid samples, identification of functional groups.	3	Students will be able to interpret IR spectra and perform the analysis.
3	NMR Spectroscopy: Identification of samples using NMR spectroscopy.	3	Students will be able to learn working principles, spectrum recording and outline of NMR spectroscopy.
4	UV-Visiblespectrophotometry:Simultaneousanalysisofcomponent systems.	3	Students will be able to interpret UV spectra and perform analysis of mixtures.
5	$\begin{array}{llllllllllllllllllllllllllllllllllll$	3	Students will be able to interpret UV spectra and determine pKa and isosbestic point of the system.
6	Titrimetric: Estimation of phosphoric acid content in cold drinks.	3	Students will be able to perform titration and estimate phosphoric acid content in real samples.
7	Estimation of paracetamol content in analgesic tablets using UV-Visible spectroscopy.	3	Students will be able to estimate pharmaceutical samples and validation of any analytical method.
8	Study of Lactate Dehydrogenase Kinetics and Inhibition Using a Microplate Reader	3	Students will learn kinetic analysis of reactions using spectrophotometric methods.
9	Study of fluorescence quenching of albumin by caffeine using multimode plate reader.	3	Students will learn how to use a multimode plate reader and they will have a basic understanding of fluorescence quenching and how to measure it.
10	Estimation of Riboflavin (vitamin B2)	3	Students will learn how to use a multimode

	in solid milk samples using		plate reader and they will be able to perform
	fluorescence spectroscopy.		analytical estimation using fluorescence.
	Gas-Chromatography: Determination		Students will be able to interpret gas
11	of hydrocarbons in a sample.	3	chromatogram and determine the
			hydrocarbons.
12	Mass spectrometry: Separation and		Students will be able to learn working
	determination of organic compounds in	3	principles, spectrum recording and outline
	a mixture.		of mass spectrometry.
	HPLC Techniques and separation	2	Students will be able to interpret HPLC
13	methods		chromatogram and perform the analysis.
	Total	42L	

Text Books:

1) Physical Chemistry, P. Atkins and J. de Paula, Oxford University Press, New Delhi, 8thEd. (2008).

Reference Books:

- Fundamentals of analytical chemistry, Douglas Skoog, Donald West, F. Holler, Stanley Crouch, Cengage Learning, 9thEd. (2013).
- Advanced Practical Inorganic Chemistry, Gurdeep Raj, Krishna Prakasan M. (Pvt.) Ltd., 22nd Ed. (2010).