PHC 262: PHARMACEUTICAL ANALYTICAL CHEMISTRY-II (2 + 1)

Prereq.: PHC 262

Course Description

The course furnishes a broad basis for instrumental analysis which comprises, colorimetry, UV-spectrophotometry, fluorometry, IR-spectrometry, flame photometry, atomic absorption, spectrophotometry, polarimetry, refractometry, conductiometry and potentiometry. Furthermore, nuclear magnetic resonance (NMR), mass-spectrometry and high-performance liquid chromatography (HPLC) will be briefly introduced.

Theoretical	**No. of Lectures**
Ultra-violet and visible spectrophotometry -Interaction of light with atoms and molecules: (Nature of light, various regions of electromagnetic spectrum, concept of quantization of energy, different types of energy of molecules). -U.V. - visible spectra of compounds: (Chromophores, auxochromes, factors affecting spectra). -Lambert - Beer's Law: (Application to single component and two component mixtures). -Instrumentation: (U.V. - visible spectrophotometers - components and function of each). -Colorimetric reactions: (Classes of reactions, conditions and chromogens).	5
Fluorometry -Theoretical background: (Exchange-energy processes induced, spectra, structural and environmental factors). -Fluorescence intensity and concentration. -Instrumentation: (Features of filter fluorimeters and fluorescence spectrophotometers). -Quantitative application.	2
Infra-red spectroscopy -Theoretical background: (Vibrational frequency, bond constant and reduced mass. Fundamental, combination and overtone bands. Degrees of freedom. Modes of vibaration). -Sample handling and instrumentation: (Different sample forms, components of IR-spectrophotometers, energy sources and detectors).	4

Theoretical	**No. of Lectures**
-Qualitative analysis: (Identification of compounds). -Quantitative application: (Base-line technique).	
Introduction to NMR spectroscopy -Theoretical. -Instrumentation. -Chemical shift. -Spin-spin coupling and decoupling. -Applications.	3
Introduction to MS spectroscopy -Theoretical. -Mass/charge ratio, mass spectrum. -Determination of molecular formula. -Applications.	2
Flame photometry and atomic absorption spectroscopy -Theoretical background: (Thermal excitation and emission, metal ions sensitive to flame emission and absorption methods - spectral and chemical interferences and their minimization). -Instrumentation: (Features of filter photometers and monochromator photometers). -Applications: Determination of alkali metal ions and divalent metal ions of pharmaceutical interest.	3
Polarimetry and refractometry -Theoretical. -Instrumental. -Measurement of angle of rotation. -Measurement of refractive index. -Application to pharmaceutical compounds.	2
Potentiometry and conductometry -Theoretical. -Instrumentation. -pH measurements. -Potentiometric titrations curves. -Conductance and conductivity. -Titration curves. -Application to pharmaceutical analysis.	4

Theoretical	**No. of Lectures**
-Application to pharmaceutical analysis. -Application of HPLC to pharmaceutical analysis.	1
Examination.	2
	Total 28

PHC 262: PRACTICAL

Lab. No.

1 & 3	- Single component analysis ($KMnO_4$) - Two component analysis - Ultra violet spectrophotometry
4 & 5	IR spectrophotometry Spectra of typical organic and pharmaceutical compounds to illustrate -OH, $-NH_2$, -NH, C = O, -COOH, C = C, etc. Base-line technique Polarimetry and refractive index
6 & 7	NMR & MS spectroscopy instrumentation Spectra, interpretation
8	Fluorometric determination of quinine sulphate λ_{ex}, λ_{em}, linearity, unknown concentrate.
9	Flame photometry and AAS
10 & 11	Potentiometry and conductometry
12	High performance liquid chromatography
13 & 14	Two Practical Exam.
14	Total