

St.James College of Pharmaceutical Sciences St.James medical Academy River Bank, Chalakudy			
Programme:	M.Pharm	Sem.:	2 nd
Name of Course: (Subject)	Advanced instrumental analysis	Course Code:	279
Teaching faculty of the course			

Summary of the Lecture Plan

Topic	Lectures	Hours
HPLC	Principle, instrumentation, pharmaceutical applications,	4
	immobilized polysaccharide CSP's: Advancement in enantiomeric separations, reversed phase Chiral method development and HILIC approaches	5
	Preparative HPLC, practical aspects of preparative HPLC.	3
Biochromatography	Principles, stationary phases and mobile phase of size exclusion chromatography, ion exchange chromatography, ion pair chromatography, affinity chromatography	3
	Gas chromatography: Principles, instrumentation, derivatization, head space sampling, columns for GC, detectors, quantification	4
	High performance Thin Layer chromatography: Principles, instrumentation, pharmaceutical applications.	3
Super critical fluid chromatography	CE characteristics, principles of CE, methods and modes of CE. General considerations and method development in CE.	3
	CE-MS hyphenation, Crown ethers as buffer additives.	2
Mass spectrometry	Theory, instrumentation of mass spectrometry, different types of ionization	2
	Mass fragmentation and its rules, meta stable ions, isotopic peaks and applications of mass spectrometry.	3
	LC-MS hyphenation and DART MS analysis. Mass analysers, MS/MS systems	2
NMR spectroscopy	Principle, Instrumentation, Solvent requirement	2
	Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin- Spin coupling, Coupling constant, Nuclear magnetic double resonance	3
	¹³ C NMR, 1-D and 2-D NMR, NOESY and COSY, LC-NMR hyphenations	2

Major issues or Core aspects to be addressed/ covered:

HPLC
Column problems, gradient HPLC, HPLC solvents, trouble shooting, sample preparation, method development,
New developments in HPLC-role and principles of ultra, nano liquid chromatography in pharmaceutical analysis
HPLC in Chiral analysis
Preparative HPLC
Biochromatography
Size exclusion chromatography, ion exchange chromatography, ion pair chromatography, affinity chromatography.
Derivatization, head space sampling, columns for GC, detectors, quantification in GC
High performance Thin Layer chromatography: Principles, instrumentation, pharmaceutical applications
Super critical fluid chromatography
Principles, instrumentation, pharmaceutical applications. Capillary electrophoresis
CE characteristics, principles of CE
Methods and modes of CE
Method development in CE, Crown ethers as buffer additives in capillary electrophoresis.
CE-MS hyphenation
Mass spectrometry
Principle, theory, instrumentation
Types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI
Fragmentation and its rules, meta stable ions, isotopic peaks and applications of mass spectrometry
Mass analyzers (Quadrupole, Time of flight, FT-ICR, ion trap and Orbitrap) instruments. MS/MS systems (Tandem: QqQ, TOF-TOF;Q-IT, Q- TOF, LTQFT, LTQ-Orbitrap).
NMR spectroscopy
Principle, Instrumentation
Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin- Spin coupling, Coupling constant, Nuclear magnetic double resonance.
Principles of FT-NMR with reference to ¹³ CNMR: Spin spin and spin lattice relaxation phenomenon
Applications of NMR spectroscopy, LC-NMR hyphenations.

Sample Questions

HPLC
Describe enantiomeric separations in HPLC.
Discuss parameters affecting peak separation in HPLC, explain resolution
Give short notes on trouble shooting techniques used in GC.
Biochromatography
Explain principle of ion pair chromatography
Explain the instrumentation of HPTLC.
Briefly explain the working of any 2 detectors used in GC.
Super critical fluid chromatography
Explain principle and pharmaceutical application of supercritical fluid chromatography.
Explain working of CE-MS hyphenation.
What is the significance of crown ethers?
Mass spectrometry
Explain MS/MS system.
Explain various ionization techniques used in mass spectroscopy.
Short notes on metastable ions and isotopic peaks.
NMR spectroscopy
Explain chemical shift, factors influencing chemical shift, expand COSY techniques.
Explain principle of ^{13}C -NMR.
Give short notes on 1-D & 2-D NMR.