

BS Chemistry Semester-VI					
Programme	BS Chemistry	Course Code	Chem-350	Credit Hours	3
Course Title	Introduction to Spectral and Separation Techniques		Course type	Major (Elective)	
Course Introduction					
<p>This course will introduce two of major groups of Analytical Chemistry i.e., Spectroscopy and Chromatography. The students will be able to learn the basic theories and the applications of these two areas of analytical chemistry.</p> <p>Introduction to Spectroscopy: Properties of Electromagnetic radiations and their interaction with matter, Development of spectroscopic analytical techniques employing various transitions, basic introduction to atomic and molecular spectroscopic techniques including flame emission, spectrophotometry, UV-VIS and IR spectroscopies</p> <p>Introduction to Chromatography: Types of separation techniques, Basic Principle of chromatography, Types of chromatography, Thin Layer Chromatography, paper Chromatography, Column chromatography, their theory, applications and limitations</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none"> 1. Explain the properties of electromagnetic radiation and its interaction with matter. 2. Describe the development of spectroscopic techniques and their applications. 3. Explain the basic principles of chromatography and various separation techniques. 					
Course Content			Assignments/Readings		
Week 1	Introduction to Spectroscopy Overview of spectroscopy Importance and applications in analytical chemistry		Collect the material from recommended books and read as per lecture		
Week 2	Electromagnetic Radiation Properties of electromagnetic radiation Interaction of electromagnetic radiation with matter		Read and understand the lecture and make possible question for discussion		
	Class Discussion				
Week 3	Development of Spectroscopic Techniques Historical development of spectroscopic techniques Various transitions and their significance in spectroscopy		Read and understand the lecture and make possible question for discussion		
Week 4	Atomic Spectroscopy Basics of atomic spectroscopy Introduction to flame emission spectroscopy		Read and understand the lecture and make possible question for discussion		
	Quiz				
Week 5	Molecular Spectroscopy Basics of molecular spectroscopy		Read and understand the lecture and make possible		

		question for discussion
	Class discussion	
Week 6	UV-VIS Spectroscopy Introduction to UV-VIS spectroscopy Principles of UV-VIS spectroscopy Applications and instrumentation	Read and understand the lecture and make possible question for discussion
Week 7	IR Spectroscopy Principles of IR spectroscopy Applications and instrumentation	Read and understand the lecture and make possible question for discussion
Week 8	Mid-term assessment	
Week 9	Introduction to Chromatography Overview of chromatography Importance and applications in analytical chemistry	Read and understand the lecture and make possible question for discussion
Week 10	Principles of Chromatography Basic principles of separation techniques Understanding retention, selectivity, and resolution	Read and understand the lecture and make possible question for discussion
	Class discussion	
Week 11	Types of Chromatography Overview of different types of chromatography	Read and understand the lecture and make possible question for discussion
Week 12	Thin Layer Chromatography Theory and principles of TLC Practical applications and limitations of TLC	Read and understand the lecture and make possible question for discussion
Week 13	Quiz	
	Paper Chromatography Theory and principles of paper chromatography Practical applications and limitations of paper chromatography	Read and understand the lecture and make possible question for discussion
Week 14	Column Chromatography Theory and principles of column chromatography Practical applications and limitations of column chromatography	Read and understand the lecture and make possible question for discussion
Week 15	Comprehensive review of spectroscopy and chromatography topics	Read and understand the lecture and make possible question for discussion
Week 16	Submission of assignments. If required, then discussion the whole chapter for final term exams preparation. Final assessment covering both spectroscopy and chromatography	

Textbooks and Reading Material

1. Skoog, West, Holler and Crouch, Fundamentals of Analytical Chemistry, 2004, Thomson Learning Academic Resource Center, USA.
2. Introduction to chromatography by Nasir-ud-din, Published by author.
3. Paper chromatography by Dr. Friedrich Cramer, London Macmillan and Co Ltd.
4. Thin- layer chromatography by Marini, Elsevier publisher.

Teaching Learning Strategies

1. Lecturing using white/black board/Multimedia
2. Written Assignments
3. Class activities and discussion
4. Quiz about last lecture
5. Presentations

Assignments: Types and Number with Calendar

Assignments, quiz, Tasks, Presentation etc.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.