School of Chemistry
Faculty of Science
University of the Punjab, Lahore
Course Outline

BS Chemistry Semester-III					
Programme	**BS Chemistry**	**Course Code**	**Chem-246**	**Credit Hours**	**2**
Course Title	**Introduction to Analytical Chemistry**		**Course Type**	**Major Elective**	

Course Introduction

This course will help the students in assessing the analytical data. The students will be able to apply various statistical tests to interpret their observations and the obtained data.

Introduction to Analytical Chemistry

Introduction and Scope of Analytical Chemistry, Analytical Science, Qualitative and Quantitative Analysis, The Analytical Process, Analytical problems and their solutions; The nature of analytical methods; trends in analytical methods

Assessment of Analytical Data

Different units of concentration and their conversion; Definition and basic concepts: nature and origin of errors, Classification of errors; Accuracy and Precision; Limits of detection and quantitation, Confidence limits; Deviation, Standard deviation, Application of statistical tests (Q, F and t tests); Significant Figures; Rounding off analytical data; Propagation of Errors, Quality control charts; Computation of analytical data.

Sampling Standardization and Calibration

Analytical Samples and methods, Sampling, Sample Handling, standardization, Calibration, Significance of sampling, weighing and measuring in Analytical chemistry

Learning Outcomes

On the completion of the course, the students will:

1. Explain the span and importance of analytical chemistry in various scientific and industrial contexts.
2. Identify the nature and origin of errors in analytical measurements and classify them appropriately.
3. Discuss the critical role of accurate sampling in obtaining reliable analytical results.
4. Explain the importance and techniques of proper sampling and sample handling.
5. Define and differentiate between accuracy and precision in the context of analytical data.

	Course Content	**Assignments/Readings**
Week 1	Introduction to Analytical Chemistry Introduction and Scope of Analytical Chemistry Overview of Analytical Science	Collect the material from recommended books and read as per lecture
Week 2	Analytical Science and Methods Detailed study of Analytical Science Introduction to Qualitative and Quantitative Analysis	Read and understand the lecture and make possible question for discussion
	Class Discussion	

Week 3	The Analytical Process Steps in the Analytical Process Discussion on Analytical Problems and Their Solutions	Read and understand the lecture and make possible question for discussion
Week 4	Trends in Analytical Methods Historical development of analytical methods Current trends and future directions	Read and understand the lecture and make possible question for discussion
	Quiz	
Week 5	Units of Concentration and Conversion Different units used in analytical chemistry Conversion between units	Read and understand the lecture and make possible question for discussion
	Class discussion	
Week 6	Nature and Origin of Errors Types of errors in analytical chemistry Nature and origin of errors	Read and understand the lecture and make possible question for discussion
Week 7	Classification of Errors Systematic and random errors Accuracy and precision in measurements	Read and understand the lecture and make possible question for discussion
Week 8	Mid-term assessment	
Week 9	Limits of Detection and Quantitation Definition and importance Techniques to determine limits	Read and understand the lecture and make possible question for discussion
	Confidence Limits and Statistical Tests Understanding confidence limits Application of Q, F, and t tests	Read and understand the lecture and make possible question for discussion
Week 10	Significant Figures and Rounding Off Data Rules for significant figures Methods for rounding off analytical data	Read and understand the lecture and make possible question for discussion
	Class discussion	
Week 11	Propagation of Errors Understanding error propagation Techniques to manage errors	Read and understand the lecture and make possible question for discussion
Week 12	Quality Control Charts Importance of quality control Creating and interpreting quality control charts	Read and understand the lecture and make possible question for discussion
Week 13	Quiz	
	Computation of Analytical Data Techniques for data computation Use of software and tools	Read and understand the lecture and make possible question for discussion
Week 14	Analytical Samples and Methods Types of samples	Read and understand the lecture and make possible

	Overview of analytical methods Importance of sampling Techniques for sample handling and standardization	question for discussion
Week 15	Calibration and Significance in Analytical Chemistry Calibration methods Importance of weighing and measuring accurately	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	

Textbooks and Reading Material

1. Analytical Chemistry by J.D. Dick, McGraw Hill, 1973, N.Y. also available in international students' edition McGraw Hill, Mogakusha, 1973.
2. Instrumental Methods by W.Ewing, Mc Graw Hill Book Co. N.Y. (Third/Fourth Edition) also available in International students edition.
3. Analytical Chemistry by G.D. Christian.
4. Skoog, West, Holler and Crouch, Fundamentals of Analytical Chemistry, 2004, Thomson Learning Academic Resource Center, USA

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.