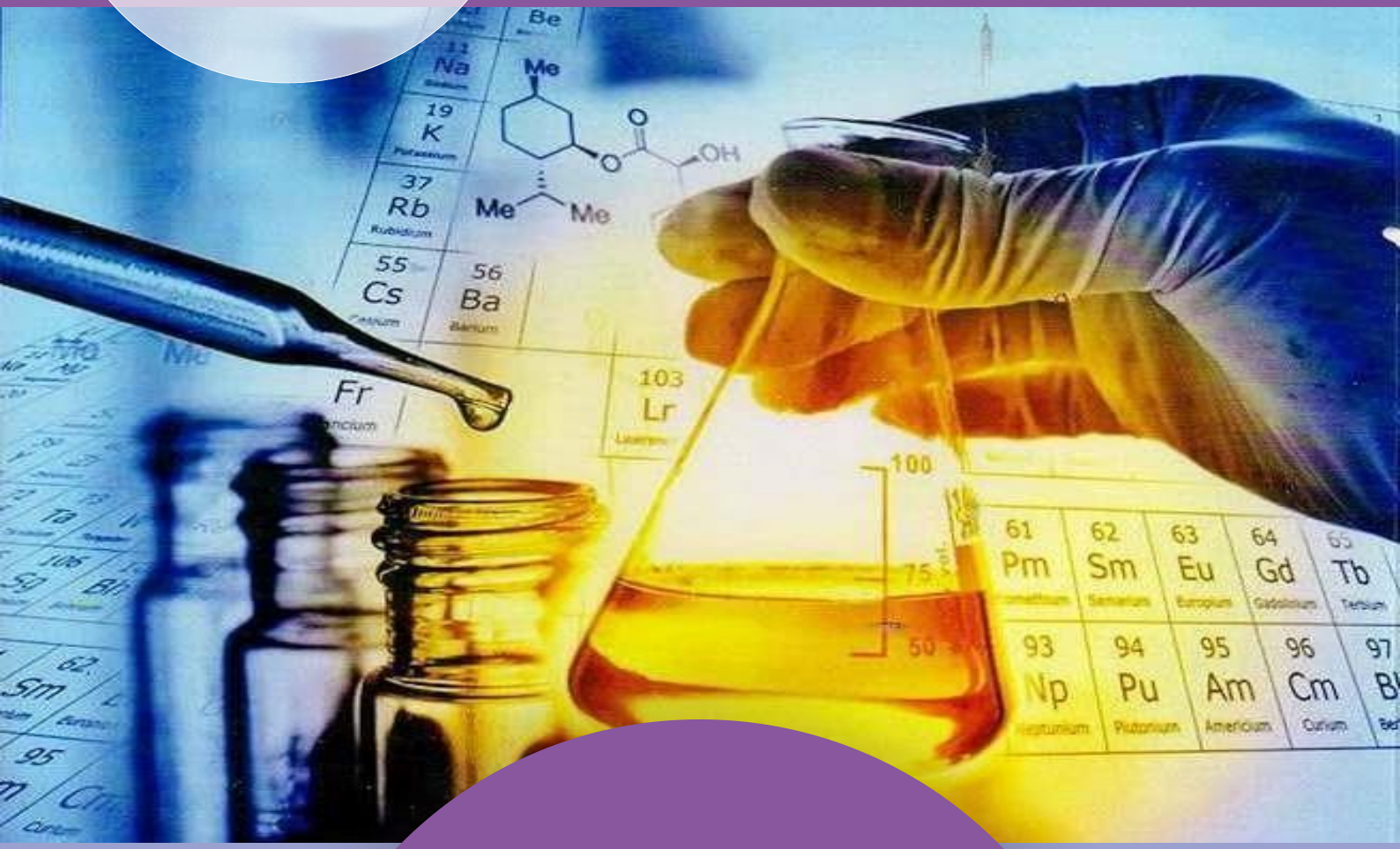
SHARDA UNIVERSITY
Beyond Boundaries

NAAC A+ ACCREDITED

SHARDA SCHOOL OF ENGINEERING & SCIENCE

Department of Chemistry and Biochemistry



COURSE

Introduction to Analytical Methods (NV33011)

VALUE ADDED COURSE BROCHURE 2025-26

SHARDA UNIVERSITY

Sharda University envisions to serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship. It has 13,000+ students from 95+ countries, 29 states, and Union Territories, providing cultural diversity and global exposure to students. It has 26000+ alumni who are today leaders in their realms. Sharda University is NAAC A+ University with Overall NIRF Rank of 87. Teaching Learning Center at Sharda University is to equip the faculty members with the expertise, skills and knowledge they need for capacity building of students. Teaching as a profession requires highly specialized skills and knowledge to impact significantly on student learning and therefore teachers must refine their conceptual and pedagogical skills.

ABOUT THE SCHOOL

Sharda School of Engineering and Science (SSES) boasts of providing an interdisciplinary approach, exposure to different disciplines in science including Chemistry, Bio-Chemistry, Physics, Mathematics, and Environmental Sciences. The Sharda School of Engineering and Science is unique from other institutions of higher learning as it is committed to imparting knowledge in pure and applied sciences, which not only forms the foundation for further academic pursuits in science and technology but also acts as the foundation for students to pursue a career in multi facet directions. The academic programs are designed to meet the requirement of the latest technological developments and envisages to become a state-of-the-art department that cater the students at Graduate, Post- Graduate and Research level along with providing high- quality education and cutting-edge interdisciplinary research in sciences. SSES has well-equipped laboratories for Physics, MATLAB, Biochemistry, Physical, Organic and Inorganic chemistry for Graduate and Post-Graduate Programs. In addition, there are Central Instrumentation Facility (CIF) and other advance research labs to promote research culture.

DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY

The Department of Chemistry & Biochemistry endeavors to be nationally recognized model for nurturing students who can contribute to the ever changing technology of 21st century. The Department is committed to provide an excellent teaching & learning atmosphere for Undergraduate as well as post graduate students.

RESOURCE PERSON

Dr. Sayanti Mandal

Dr. Sayanti Mandal is presently serving as an Assistant Professor in the Department of Chemistry and Biochemistry, Sharda University. She is currently fuelling her passion for teaching Biochemistry to the undergraduate and post graduate students. She formerly served as Assistant Professor of Biotechnology at Dr. D.Y. Patil ACS College, Pune and Institute of Bioinformatics & Biotechnology (Now merged with department of Biotechnology), Pune University and fulfilled the duties of multiple administrative positions.

She holds a bachelor degree in Botany (Hons.) and postgraduate degree in Biochemistry from Banaras Hindu University. After post-graduating she perused her research from University of Delhi (Genetics), in the area of host-plant interaction and resistance. Her work was centred on plant pathogen interaction and development of transgenic Brassica juncea which displayed enhanced resistance against fungal disease. Her published work deals with the establishment of Arabidopsis as a model plant for the fungi *Alternara brassicae*. Soon afterward she expanded her work towards the second largest oil yielding crop, Brassica juncea, where she could identify genes responsible for susceptibility towards A. brassicae infections. She has published several research papers and review articles in peer-reviewed and high impact factor International Journals. Currently she is using functional genomics and proteomic tools to gain better understanding genes responsible for causing disease. Dr. Mandal has also received skill development training at CCMB, Hyderabad in Next Generation Sequencing (NGS) Data analysis. She also served as a CSIR-JRF fellow to pursue her PhD.

MODULE

School: SSBSR	**Batch : 2025-29**
Program: B.Sc. (UG)	**Current Academic Year: 2025-26**
Branch: Chemistry/Biochemistry	**Term : Even (2502), Semester : II**
1. Course Code	**NV33011**
2. Course Title	**Introduction to Analytical Methods**
3. Credits	
4. LTPC	**(30 Hours)**
Course Type	**Value added course**
5. Course Objective	Students will gain the knowledge and skill on the various instrumental techniques adopted in the laboratory. They will become conversant of how to do sample preparation, separation of mixture into pure ingredients, safe handling of chemicalsandsetting up thereactionassembly. Student will have the knowledge of: • Instrumental measurements& Calibration (HPLC and UV-Vis Spectroscopy) • Standards, Blank and sample preparation • Separation, purification and characterization of functional properties Setting up of apparatus for chemical reactions; pressure reactions, vapor phase reactions, photochemical reactions, electro-chemical reactions etc.
6. Course Outcomes	CO1: The student will be able to understand the use of analytical practices used for data acquisition in chemical laboratory. CO2: The student will be able to understand the sample preparation techniques adopted in laboratory. CO3: The student will be able to learn mixture separation, purification and characterization techniques. CO4: The student will be able to measure the chemical properties of materials. CO5: The student will be able to adopt safe chemical laboratory handling & storage of chemicals. CO6: The student will be able to gain knowledge on assembling of glass apparatus to perform specialized laboratory reactions.
7. Course Description	This course will introduce instrumental methods and practices adopted in chemical laboratory related to mixture separation, material purification, characterization and synthesis of commercial products while practicing safe handling and storage instructions of hazardous and explosive chemicals.

8. Outline syllabus		CO Mapping
Unit 1	**Introduction to Instrumental Chemistry**	
A	Review of the Analytical Chemistry, Analysis Methods,	CO1/CO6
B	Basics of Measurement; Sensors, Detectors, and Thermocouples	CO1/CO6
C	Calibration of an Instrument and Data Acquisition	CO1/CO6
Unit 2	**Standards, Blanks & Sample Preparation**	
A	Sample Preparation: Particle Size Reduction, Sample Homogenization, Solid-Liquid Extraction	CO2/CO6
B	Extraction from Liquid Solutions, Separatory Funnel, Percent Extracted, Dilution, Concentration using Evaporators, and Solvent Exchange, Sample Stability	CO2/CO6
C	Preparation of Standards, Blanks and Controls	CO2/CO6
Unit 3	**Separation, Identification & Characterization**	
A	Introduction to basic Chromatography, Spectroscopy,	CO3/CO6
B	Qualitative/Quantitative Analysis using analytical techniques, HPLC (High-performance liquid chromatography)	CO3/CO6
C	Qualitative/Quantitative Analysis using analytical techniques, UV-Vis Spectroscopy (Ultraviolet-visible spectroscopy)	CO3/CO6
Unit 4	**Laboratory Apparatus & Reaction Procedures**	
A	General Laboratory Apparatus, Ground glass joints	CO4/CO6
B	Mechanical Agitation, Reaction assemblies for standard reaction procedure	CO4/CO6
C	Pressure Reactions and Vapour Phase Reaction	CO4/CO6
Unit 5	**Material Handling & Storage**	
A	Preparation of Material Safety Data Sheet (MSDS) including General Instruction for safe handling of chemicals in laboratory	CO5/CO6
B	Hazards in Chemical laboratory, Explosion & Fire Hazards	CO5/CO6
C	Reactive Reagents, Toxic Chemicals, Hazards Symbols	CO5/CO6
Mode of examination	Assignments, Quizzes & Viva	