

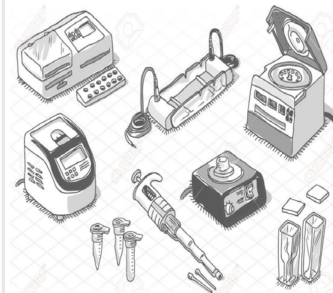
19BT213 BIOANALYTICAL TECHNIQUES

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	20	50	1	12	3	2



Source:
https://www.123rf.com/photo_37102119_stock-vector-sketch-molecular-biology-laboratory

PREREQUISITE COURSES: Chemistry and Physics.

COURSE DESCRIPTION AND OBJECTIVES:

The course provides an indepth understanding of various scientific instruments used for analysis. The objective of this course is to understand the scope of application, advantages and limitations of the various modern analytical and separation techniques.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the basic principles of different bioanalytical techniques.	1,2
2	Apply the analytical methods in biotechnology industries.	1
3	Analyze the error, repeatability, precision and accuracy of instruments.	2
4	Assess the results of electrophoresis.	3
5	Develop the method for the separation of biomolecules.	3

SKILLS:

- ✓ Skilled handling of microscope.
- ✓ Handling of UV Visible spectrophotometer.
- ✓ Skilled handling of chromatography techniques.
- ✓ Experience in working with datasets.

UNIT - I**L-9**

MICROSCOPY: Sample Preparation, Types of analytical methods; Instruments used for analysis; Microscopy - bright field, dark field, fluorescent, phase contrast, confocal microscopy; Electron microscopy - SEM and TEM; Flow cytometry.

UNIT - II**L-9**

UV-VISIBLE AND IR SPECTROSCOPY: Sample preparation, General principles; Types of spectra and their biochemical applications; Basic laws of light absorption; Electromagnetic radiation, Beer-Lambert's law and apparent deviations; UV-Visible spectrophotometer Infra-Red spectroscopy and applications.

UNIT - III**L-9**

NMR AND X-RAY SPECTROSCOPY: Sample preparation, NMR - chemical shift, spin-spin coupling, applications of proton NMR, quantitative analysis and qualitative analysis, 2D-NMR, application of NMR in biology; Principle mode of operation and applications of X-ray spectroscopy.

UNIT - IV**L-9**

CENTRIFUGATION AND ELECTROPHORESIS: Sample preparation, Centrifugation - introduction, basic principles, different types of centrifuges, types of centrifuge rotors, RPM-RCF, ultra centrifugation, velocity sedimentation, density gradient centrifugation; Electrophoresis - principles, types (disc, slab isoelectric focusing, isotachopheresis) and supporting materials-paper, starch, agarose and polyacrylamide; Ultra filtration, Dialysis and Reverse osmosis.

UNIT - V**L-9**

CHROMATOGRAPHY: Sample preparation; Chromatography - general principles, ion-exchange chromatography, gel - filtration chromatography, affinity chromatography, HPLC, gas chromatography, LCMS, mass spectroscopy and its applications.

LABORATORY EXPERIMENTS

LIST OF LAB ACTIVITIES

TOTAL HOURS: 30

1. Calibration of pH meter.
2. Determination of lambda max using UV visible spectrophotometer.
3. Estimation of Molar extinction Co-efficient using Beer Lamberts law.
4. Pipetting practice using a dye.
5. Estimation of reducing sugars (Benedict's method).
6. Estimation of proteins and nucleic acids by U.V. method.
7. Sample analysis by HPLC.
8. Estimation of vitamin B by turbidometry method.
9. Estimation of chlorophyll by colorimetric method.

TEXT BOOKS:

1. K. Wilson, and J. Walker, "Principles and Techniques of Biochemistry and Molecular Biology", 7th edition, Cambridge University Press, 2010.
2. J. Jayaraman, "Laboratory Manual in Biochemistry", 1st edition, New Age International Publications, 2007.
3. K. Wilson and J. Walker, "Principles & Techniques of Practical Biochemistry", 6th edition, Cambridge University Press, 2007.
4. R.F. Boyer, "Modern Experimental Biochemistry", 3rd edition, Pearson Education, 2001.

REFERENCE BOOKS:

1. K.Wilson, K. H. Goulding, "A Biologist Guide to Principles and Techniques of Practical Biochemistry", 3rd edition, ELBS Series 2006.
2. A. Douglas, Skoog & West, "Fundamentals of Analytical Chemistry", 8th edition, Harcourt Publications, 2006.
3. F. Settle, "Hand Book of Instrumental Techniques for Analytical Chemistry", Prentice Hall Publications, 1997.
4. H. H Willard, D. L. Merritt and J. R. J. A. Dean, "Instrumental Methods of Analysis", CBS Publishers and Distributors, 1992.
5. G. Chatwal and K. Anand, "Instrumental Methods of Chemical Analysis", 5th edition, Himalaya Publications, 2006.