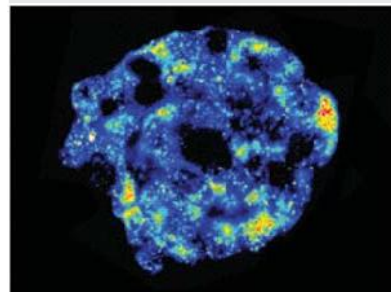


16BT207

INSTRUMENTAL METHODS OF BIOLOGICAL ANALYSIS

Hours Per Week :

L	T	P	C
3	-	2	4



Source:
<http://cdn.phys.org>

Course Description and Objectives:

The course provides an understanding of principles and functions of various scientific instruments used for analysis of biological molecules. The objective of this course is to impart technical knowledge on applications, advantages and limitations of the various analytical and separation tools and techniques.

Course Outcomes:

Upon completion of the course, the student will be able to

- CO1: Understand the basic principles of different bio analytical methods.
- CO2: Analyze error, repeatability, precision and accuracy of instruments.
- CO3: Understand the advantages and limitations of various analytical techniques.
- CO4: Knowledge about techniques related to centrifugation and electrophoresis.
- CO5: Separate biomolecules using membrane and chromatographic techniques.

SKILLS:

- ✓ *Skilled handling of microscope.*
- ✓ *Handling of UV Visible spectrophotometer.*
- ✓ *Chromatography techniques.*
- ✓ *Experience in working with data sets.*

ACTIVITIES:

- *Qualitative and quantitative analysis of biomolecules.*
- *Purify biomolecules from plants.*
- *Disrupt different cells using sonicator.*
- *Compare different analytical methods to estimate enzymes.*

I UNIT

L- 09

INTRODUCTION TO IMA AND MICROSCOPY: Types of analytical methods; Instruments used for analysis; Uncertainties in instrumental measurements - sensitivity and detection limit for instruments; Microscopy- bright field, dark field, fluorescent, phase contrast, confocal microscopy, SEM and TEM; Flow cytometry.

II UNIT

L- 09

UV-VISIBLE AND IR SPECTROSCOPY: 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 and Infra-Red spectroscopy.

III UNIT

L- 09

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

IV UNIT

L- 09

CENTRIFUGATION AND ELECTROPHORESIS: Centrifugation-introduction, types of centrifuge rotors, RPM-RCF, ultra centrifugation, velocity sedimentation, density gradient centrifugation; Electrophoresis - principles, types (disc, isoelectric focusing, immuno-electrophoresis, isotachopheresis) and supporting materials-paper, starch, agarose and polyacrylamide.

V UNIT

L- 09

SEPARATION EQUIPMENTS - PRINCIPLES AND OPERATIONS: HPLC, gas chromatography, ion-exchange chromatography, gel - filtration chromatography, affinity chromatography, membrane separations, ultra filtration and reverse osmosis.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

Total hours: 30

1. Verification of Lambert -Beers Law by UV -VIS spectrophotometer.
2. Estimation of reducing sugars (Benedict's method).
3. Estimation of proteins and nucleic acids by U.V. method.
4. Separation of different macromolecules by HPLC.
5. Estimation of vitamin B by turbidometry method.
6. Estimation of turbidity by U.V. method.
7. Estimation of chlorophyll by colorimetric method.
8. Determination of lambda max.
9. Calibration of pH meter.

TEXT BOOKS:

1. J. Jayaraman, "Laboratory Manual in Biochemistry", 1st edition, New Age International Publications, 2007.
2. K. Wilson and J. Walker, "Principles & Techniques of Practical Biochemistry", 6th edition, Cambridge University Press, 2007.
3. 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.