

MANGALORE UNIVERSITY
DEPARTMENT OF BIOSCIENCE

BSS405 BIO-ANALYTICAL TECHNIQUES

Course Outcomes:

Upon successful completion of the course, students will be able to:

- Know the basics and terminologies of various analytical techniques used in Biological sciences.
- Understand the principles and utilities of advanced chromatographic techniques, electrophoresis and ultracentrifugation.
- Explain the principles and applications of tracer techniques, including the handling of radionuclides.
- Address the principles of biophysical methods for analysis of biopolymer structure.
- Appreciate the usefulness of various advanced technologies such as UV, ORD, CD, NMR, ESR spectroscopy and atomic absorption spectroscopy.
- Connect biology and nanotechnology deriving various applications.
- Gain the knowledge of biophotonics, biosensors and electrophysiology and their biomedical applications.

Unit I (13 hours)

Principles and applications of Thin Layer Chromatography, Gel filtration, ion exchange and affinity chromatography, HPLC, Electrophoresis, electro focusing and ultra- centrifugation (Velocity and buoyant density), Principle and applications of tracer technique in biology, Radiation dosimetry. Radioactive isotopes and half life of an isotope, Effects of radiation on biological system, Cerenkov radiation, Liquid scintillation counter and radiation measurement

Unit II (13 hours)

Principles of biophysical methods for analysis of biopolymer structure. X-ray diffraction, fluorescence UV, ORD, CD, visible NMR and ESR spectroscopy, Atomic absorption spectroscopy and plasma emission spectroscopy, Principles and applications of Bionanotechnology

Unit III (13 hours)

Biophotonics, Biosensors-principles, design, working, types and applications, Electrophysiology, single neuron recording, patch-clamp recording, medical biophysics, neuroimaging techniques, PET, MRI, fMRI, CAT, Calcium imaging techniques

References:

1. Biophysics - V. Pattabhi & N. Gautham, 2003, Narosa Publishing house,
2. Basic Concepts of Analytical Chemistry - S. M. Khopkar, 2008, 3rd Ed., New Age Publications.
3. Biophysical Chemistry-Principles and Techniques - A. Upadhyay, K. Upadhyay, N. Nath, 2005, Himalaya publishing house
4. Nuclear and Radiochemistry - Gerhart Friedlander, 1981, 3rd Ed., Wiley.
5. Biophysical Chemistry Part II. Techniques for the study of biological structure and function - C. R. Cantor, P. R. Schimmel. 1980, W.H. Freeman
6. Principles of Bioinorganic Chemistry - S. J. Lippard, J. M. Berg, 1997, Panama Publishing.
7. Molecular & Cellular Biophysics - M. B. Jackson, 2006, Cambridge University press.
8. Principles of Physical Biochemistry - K. E. van Holde, W. C. Johnson, P. S. Ho, 1998, Prentice Hall.
9. Physical Biochemistry by D. Freifelder IIInd Edition(1982)
10. Biochemical calculation by I.H. Segal IIInd Edition (1976)
12. Wilson, K. and Walker, J.(1996). Practical biochemistry.Principles and Techniques. Cambridge Low Price Editions
13. Shrikant, L. P. (2013) Understanding Biophysics. 4th edition, Sumana Publications.
14. Krishna A. P (2014) Text book of Medical Physiology, 2nd edition. Suman Publications.
15. Biophysical chemistry (principles and techniques) Upadhyay Mumbai: Himalaya Pub. House, 2009.

