MANGALORE UNIVERSITY

Department of Biosciences

MSc Environmental Science

ESS453 ADVANCED INSTRUMENTATION

Course Outcomes:

CO1 Describe the principles and applications of instruments under spectroscopy, nephelometry, turbidometry and chromatography.
CO2 Understand the principles and applications of various instruments in the field of environmental science.
CO3 Get the knowledge of applications of instruments in environmental sample analysis.
CO4 Describe the applications of polarography in the environmental sample analysis.
CO5 Understand radio-chemical techniques.

UNIT I (13 hours)

Optical methods: Various ranges of electromagnetic radiations, interaction of electromagnetic radiation with matter, UV-Visible spectroscopy: Theory, instrumentation and applications to environmental samples, optical fibers in spectroscopy. X-ray fluorescence, X-ray diffraction.

UNIT II (13 hours)

IR and NDIR spectroscopy: Molecular vibrations and vibration frequencies, special features of IR and NDIR instruments, applications for the environmental samples. Continuous monitoring of CO using NDIR spectroscopy, Atomic Absorption Spectrophotometer: Principle, instrumentation and applications in environmental sample analysis. Atomic Emission Spectroscopy: Principle, instrumentation and applications of flame emission spectroscopy.

UNIT III (13 hours)

Nephelometry and turbidimetry: Principles and applications in the determination of turbidity of water. Thermoquality. Radio analytical methods: Radiochemical techniques - Principles and applications of neutron activation analysis and isotope dilution analysis. Polarography: Principles, instrumentation and applications of polarography in the environmental sample analysis. Solvent extraction, thin layer chromatography, gas chromatography, HPLC and Ion exchange chromatography.

References:

1. Bour, E.J. Introduction to Chemical Instrumentation, Wiley & Sons, 4th Edition (1982)
2. Christian, G.D. Analytical Chemistry, 5th Edition, John Wiley and Sons Inc., India (2001)
3. Khopkar, S.M. Basic concepts of Analytical Chemistry, 2nd Edition, New Age International Publ. (1998)
4. Khopkar, S.M. Environmental Pollution analysis, Wiley Eastern Ltd. (1993)
5. Skoog, D.A., Holler, F.J. and Nieman, T.A. Principles of Instrumental analysis, 5th Edition, Thomson Asia Pvt. Ltd., Singapore, (1980)
6. Vogel, A.I. Quantitative analysis, 6th Edition, Prentice Hall Inc. (1998)