

FRN 322: BIOTECHNOLOGY: APPLICATION IN ENVIRONMENT AND FORESTRY**SYLLABUS**

Introduction and history, scope of environmental biotechnology; Biochemistry and molecular biology; Cell as a unit of life, cellular components, biomolecules, enzymes; Molecular genetics – nuclear material, central dogma, replication, repair and recombination of genetic material, translation, transcription, mutation; Molecular biological techniques; DNA and RNA purification; isolation of plasmid; polymerase chain reaction; cloning and recombinant technology; enzyme assays; biochemical assays (identification of microbes); enzyme-linked immunosorbent assay (ELISA); Instrumentation-UV-visible and fluorescence spectroscopy), Electron Microscopy Techniques (SEM and TEM), High Performance Liquid Chromatography (HPLC), laminar air flow, hot air oven, microwave, incubator, gel electrophoresis, pH meter, Fourier-transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD); Microbiology and industrial applications; Classification of microorganisms, microorganisms in extreme environment, pathogenic and useful microorganisms; Microbial enzymes in industrial applications; Involvement of microorganisms in fermentation; Production of biofertilizers, Biogas, Bioethanol and Biopolymers; and food industry; Biotechnological applications in pollution management: solid waste management and waste water treatment; role of microorganisms in sewage treatment and degradation of municipal solid waste; degradation of plastics and polymers using microorganisms; Environmental remediation: Bioremediation-remediation of toxic compounds using plants and microorganisms; Nanobiotechnology – green synthesis of nanomaterials, application of nanomaterials in combating environmental pollution; Advanced environmental biotechnology applications: biofilms, biosensors and genetically engineered microorganisms in environmental applications; significance and importance of biocorrosion and bioleaching in environmental pollution; Bio-safety in analytical procedures

SUGGESTED READINGS:

- [1] *Indian Forestry* by K. Manikandan
- [2] *Text Book of Biotechnology* by R.C Dubey.
- [3] *Text Book of Biotechnology* by H.K. Das.
- [4] *A Textbook of Biotechnology* by S.C.Rastogi and Shivani Rastogi