

Course Type	Course Code	Name of the Course	L	T	P	Credits
DP	NESC505	Soil and Microbiology Practical	0	0	3	1.5

#### Course Objectives

- To understand the analysis of soil and microbiological parameters.
- Develop understanding about the microbiology of air, water and soil environment.

#### Overall Learning Outcomes

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

- Plan and conduct an experiment for physico-chemical and nutritional properties of soil
- Understand the preparation of culture media and staining techniques.
- Learn methods for enumeration of microbes from air, water and soil.

Unit No.	Topics to be covered	Practical Hr (P)	Learning outcomes
I	Determination of Specific Gravity, Bulk Density and Moisture Content of soil sample.	3	To understand physical conditions of soil
II	Determination of Organic Carbon, and CEC of a given soil sample.	3	To understand chemical properties of soil.
III	Determination of Nitrogen Phosphorus and Potassium (NPK) in soil.	3	To understand fertility of soil
IV	Determination of Bioavailable and Total Heavy Metals in soil.	3	To understand the metal contamination, if any in soil
V	Quantitative and qualitative characters of plant communities. Ecological sampling	3	To understand community composition of an ecosystem
VI	Study of vegetation of pond ecosystem. Study of fresh water and polluted water algae – (Blue green algae, Green algae and Diatoms).	3	To understand the basics of aquatic ecosystem
VII	Culture media preparation– Semi-synthetic and Synthetic media. Liquid, Solid and semisolid media, Nutrient agar, PDA media.	3	To understand the culturing process of bacteria
VIII	Gram staining techniques for detection of gram positive and gram- negative bacteria. Study of fungi (medium – Rose Bengal agar).	3	To visualize the nature of microorganisms.
IX	Bacteriology of drinking water and domestic sewage - MPN techniques for total coliform, Faecal coliform and Faecal Streptococci (FS), Membrane filtration techniques for faecal coliform and total coliform.	3	To understand to bacteriological contamination of water.
X	Biochemical characterization of the microbes (bacteria) (IMViC test.)	3	To understand the biochemical properties of microbes.
XI	Microbiology of Air: Enumeration of microbes by exposure plate method.	3	To understand to microbiological contamination of air.
XII	Microbiology of soil: Isolation of microbes by serial dilution methods and colony count by colony counter.	3	To understand to microbial flora of soil.
XII	Practice & Review	6	To enhance the knowledge and assess the progress.
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#### Text books:

- SK Maiti. Handbook of methods in Environmental analysis (Vol I & 2). Oxford, India.
- K.R. Aneja (2017). Experiments in Microbiology, Plant Pathology and Biotechnology; New Age International, New Delhi.

#### Reference books:

- Standard Methods for the Examination of Water and Wastewater (23<sup>rd</sup> Ed) by APHA
- J. G. Cappuccino, N. Sherman (2014) Microbiology, a laboratory Manual. Benjamin-Cummings Publishing Company, SF, USA.