Course Type	Course Code	Name of Course	L	T	P	Credit
DP	NCEC539	Experimental Geotechnics II: In-Situ Testing & Physical Modelling	0	0	3	1.5

Course Objective

This course aims to equip students with practical skills in performing and interpreting in-situ geotechnical tests to evaluate soil properties. It emphasizes hands-on experience and data analysis for real-world geotechnical engineering applications.

Learning Outcomes

- Perform and interpret key in-situ tests like SPT, CPT, DCPT, VST, PMT, and DMT to characterize soil strength, stiffness, and deformation properties.
- Analyze hydraulic conductivity, subsurface profiles, and dynamic soil behavior using borehole permeability tests, ERT, and block vibration tests.
- Measure in-situ moisture, stress, and geosynthetics properties to assess soil-structure interactions and material performance.
- Apply test results to foundation design, stability analysis, and site characterization while understanding test limitations and corrections.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Standard Penetration Test (SPT)	3	To understand and learn interpretation of SPT N-values for soil characterization, it's limitations and corrections (e.g., energy efficiency, overburden pressure)
2	Cone Penetration Test (CPT)	3	To learn Measurement of tip resistance, sleeve friction, pore pressure, and estimation of shear strength parameters
3	Dynamic Cone Penetration Test (DCPT)	3	To understand penetration resistance principles by using a falling weight and cone and interpret data to assess soil strength and compaction behaviour.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
4	Vane Shear Test (VST)	3	To learn field measurement of undrained shear strength in soft clays
5	Pressure meter Test (PMT)	3	To learn determination of stress-strain behaviour and shear modulus
6	Borehole Permeability Tests	3	To perform borehole permeability tests and interpret hydraulic conductivity data for seepage and stability design.
7	Electrical Resistivity Tomography (ERT)	3	To interpret subsurface profiles for site characterization while evaluating its non-invasive advantages.
8	Static Plate Load Test	3	To learn and understand load-settlement behaviour, analyse bearing capacity and subgrade modulus
9	Block Vibration Test	3	To determine dynamic properties (damping) properties of soils by applying controlled vibrations to a concrete block placed in soil.
10	Measurement of in-situ moisture and total stress using sensors	3	To learn to grasp soil-water-stress interactions, deploy sensors, and analyse moisture and stress data.
11	Mechanical properties testing of geosynthetics	3	To learn to determine strength properties such as compressive, tensile and puncture stress of geosynthetics under static loading
12	Bender Element Test	3	To learn to determine the small-strain shear modulus (G_{max}) of soils, which is a critical parameter for understanding soil stiffness at very low strains
13	Project	6	
	Total Contact Hours	**42**	

Text Books:

1. Hunt, R. E. (2005). *Geotechnical engineering investigation handbook* (2nd ed.). CRC Press, Boca Raton, FL.

Refference Books:

1. Relevant standards and codal provisions

1. Das, B. M., and Sobhan, K. (2017). *Principles of geotechnical engineering* (9th ed.). Cengage Learning, Boston, MA.
2. Bowles, J. E. (1996). *Foundation analysis and design* (5th ed.). McGraw-Hill, New York, NY.
3. Mayne, P. W., Christopher, B. R., and DeJong, J. (2002). Subsurface investigations—Geotechnical site characterization. Federal Highway Administration, Washington, DC.