

Course Contents:

Introduction: Sources and types of uncertainties associated with geotechnical analysis, importance of probabilistic methods and reliability based analysis in geotechnical engineering
Review of probability and statistics: Discrete and continuous random variables, parameter estimation, testing of hypothesis, regression analysis
Fundamentals of reliability analysis: First Order Second Moment (FOSM) method, First Order Reliability Method (FORM), Second Order Reliability Method (SORM), Monte Carlo simulation
Application towards geotechnical problems: Characterization of uncertainty in field measured and laboratory measured soil properties, uncertainty in interpretation techniques
Spatial variability of soil properties, scale of fluctuations, estimation of auto correlation and auto covariance
Probabilistic groundwater modeling, flow through earth dams
Probabilistic slope stability analysis
Fundamentals of LRFD design methodology, reliability based design of shallow and deep foundations, settlement analysis
Reliability based liquefaction analysis, lateral spreading
Development of fragility curves for geotechnical problems