Course Type	Course Code	Name of Course	L	T	P	Credit
OE	CEO301	Reliability and Risk Assessment	3	0	0	9

Course Objective

To provide the students a thorough understanding of the key concepts behind reliability and risk analyses of engineering structures.

Learning Outcomes

Knowledge of risk assessment methods for decision making under uncertain conditions.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Uncertainty and Reliability:** Sources of uncertainty in Geotechnical design parameters, In-situ soil characterization, Sensitivity analysis, Modelling of uncertainty	5	Concepts of uncertainty and reliability in Geotechnical Engineering
2	**Methods of reliability analysis:** Fragility curves, Probability of failure, FORM, Monte Carlo Simulation Techniques, Response Surface Method, Parallel and series systems. Explicit and implicit functions, Target reliability index, LRFD approach	14	Methods of reliability analysis.
3	**Application of reliability analysis:** Applications to shallow and deep foundations, landslides and embankments, liquefaction behavior of soils.	8	Application of reliability analysis to field problems.
4	**Risk Assessment and analysis**: Concept of risk, objective and scope of risk assessment, Probabilistic risk, Risk perception and acceptability, Quantitative aspects of risk. Three levels of risk quantification, PRA management, Preliminary hazard analysis.	15	Concepts of risk assessment and analysis

Text Books:

1. Baechaer, G. and Christian, J. (2005). Reliability and Statistics in Geotechnical Engineering, Wiley Publications.
2. Griffiths, D.V. and Fenton, G.A. (2007). Probabilistic Methods in Geotechnical Engineering, Springer.

Reference Books:

1. Haldar, A. and Mahadevan, S. (2000). Probability, Reliability and Statistical Methods in Engineering Design,Wiley.
2. Phoon, K.K. (2008). Reliability based Design in Geotechnical Engineering: Computations and Applications, Taylor and Francis.