PROBABILITY METHODS IN CIVIL ENGINEERING

PROF. RAJIB MAITY
Department of Civil Engineering
IIT Kharagpur

TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 12 Weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 24 Apr 2022

PRE-REQUISITES : Basic Knowledge of Probability and Statistics

INTENDED AUDIENCE : Core Course and students of BE/ME/MS/MSc/PhD.

COURSE OUTLINE :

Concept of probability and statistics is very important to solve various civil engineering problems. In this course, basic probability concept and different probabilistic models will be discussed. Concept and definition of random variables and different functions of random variables will be covered in the initial part of the course. Afterwards, focus is given to commonly used probability distribution functions in civil engineering. Discussions on statistics and sampling are presented towards the last part of the course. In this part, goodness of fit tests, regression and correlation analyses, estimation of distribution parameters from statistics, hypothesis testing and their significance will be discussed. Each topic is discussed with reference to different application problems and their solutions in different fields of civil engineering, such as Structural Engineering, Transportation Engineering, Water Resources and Environmental Engineering, Geotechnical Engineering etc.

ABOUT INSTRUCTOR :

Prof. Rajib Maity is Associate Professor of Department of Civil Engineering, Indian Institute of Technology, Kharagpur, India. His research area includes hydroclimatology, stochastic hydrology, climate impacts on water resources, hydrologic time series analyses and forecasting etc. He has published one book on 'Hydroclimatic Teleconnection: Indian Perspective' and about 60 research articles in different peer reviewed journals and conferences and chapters in books. His research work has been funded by various agencies such as DST, ISRO, MoES, MHRD, AISRF and IBM. Some of his professional recognitions includes Prof. R. J. Garde Research Award, ASCE 2011 Outstanding Reviewer (USA), Emerging Leaders Fellowship (Australia), BOYSCAST Fellowship, IEI Young Engineers Award, DAAD fellowship for IIT faculty (Germany), International ICE WaRM Fellowship (Australia), Prof. N. S. Govinda Rao Memorial Gold Medal, IISc. He is an associate editor of Journal of Earth System Sciences (by Springer), and ISH Journal of Hydraulic Engineering (by Taylor and Francis). For more information please visit http:// www.facweb.iitkgp.ernet.in/~rajibmaity/.

COURSE PLAN :

Week 1**:** Random events, Probability, Set Theory, Assignment

Week 2**:** Axioms of Probability, Assignment

Week 3**:** Random Variables, Probability Distribution Functions

Week 4**:** Cumulative Distribution Functions, Descriptors of random variables, Assignment

Week 5**:** Probability Distribution of discrete and continuous random variables, Assignment

Week 6**:** Probability Distribution of continuous random variables, Assignment

Week 7**:** Functions of Random Variables, Assignment

Week 8**:** Common Probability Models, Normal, Log Normal and exponential distributions

Week 9**:** Gamma and Extreme value distributions, Assignment

Week 10**:** Sampling distribution, Parameter Estimation, Assignment

Week 11**:** Hypothesis testing, Goodness-of-fit tests, Assignment

Week 12**:** Regression Analysis, Assignment