1.	Title of the course	Statistical Simulations and Data Analysis
2.	Course number	MA626L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To MA6035/12
6.	To be offered by	Department of Mathematics and Statistics
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	**Course Objective(s):** To introduce essential techniques of statistical simulation. To gain hands-on experience with recreation of real-life data using synthetic data. To analyze and make decisions based on statistical simulations.	
10.	**Course Content:** Pseudorandom number generation, random numbers to evaluate integrals, inverse transform method, acceptance-rejection technique, generating discrete random variables and vectors, the inverse transform algorithm, rejection method, generating continuous random variables, vectors, and processes, generating variables from copula models, single, series and parallel queueing system simulation, insurance risk model and stock price model simulation, simulation involving mean and variance; Variance reduction techniques: antithetic variable, control variates, conditioning, stratified sampling, importance sampling; Evaluating an exotic option, conditional Bernoulli sampling, normalized importance sampling, Latin hypercube sampling, goodness of fit test, Hastings Metropolis algorithm, Gibbs sampler.	
11.	**Textbook(s):** 1. Robert C and Casella G, *Monte Carlo Statistical Methods*, 1st Edition, Springer (2004). 2. Ross S, *Simulation*, 5th Edition, Academic Press (2013).	
12.	**Reference(s):** 1. Bucklew J A, *Introduction to Rare Event Simulation*, 1st Edition, Springer (2004). 2. Chen D G and Chen J D, *Monte-Carlo Simulation-Based Statistical Modeling*, 1st Edition, Springer (2017). 3. Iacus S M, *Simulation and Inference for Stochastic Differential Equations*, 1st Edition, Springer (2008). 4. Robert C and Casella G, *Introducing Monte Carlo Methods with R*, 1st Edition, Springer (2010).	