Tribhuvan University
Bachelor of Computer Science and Information Technology
Simulation and modeling

Course Title : Simulation and Modeling

Course No : CSC-302

Credit Hours : 3

Full Marks	**:** 60+20+20
Pass Marks	: 24+8+8

Nature of Course : Theory (3 Hrs.) + Lab (3 Hrs.)

Course Synopsis : This Course provides the discrete and continuous system, generation of random variables, analysis of Simulation output and simulation languages.

Micro Syllabus

Unit	Break down	Hours	Remarks
1. Introduction to Simulation	1. System Concept, Boundary Environment 2. Continuous and Discrete System, Real time Simulation 3. Types of simulation model(static physical, Dynamic Physical, Static Mathematical) 4. Principles used in Modeling, Distributed Lag Model 5. Phases and steps in Simulation Study 6. Advantages and Disadvantages of Simulation 7. Areas of Application.	0.5 0.5 2 1 1 0.5 0.5	
2. Simulation of Continuous System	1. Queuing System ➢ Introduction, Characteristics, Notation, Discipline ➢ Single Server queues ➢ Server Utilization, Concept of Multi server queues 2. Markov Chains ➢ Introduction ➢ Application and examples 3. Differential and Partial ➢ Differential equations	0.5 1 0.5 2 1	
3. Random Numbers	1. Introduction, Table, Pseudo Random Numbers 2. Generation of Random Numbers a. Uniform-Linear Congruential Method b. Non Uniform-Inverse Transformation, Rejection	1 2 2	

	3. Testing for Randomness a. Uniformity (Frequency) Test i. Kolmogorov-Smirnov Test ii. Chi-Square Test b. Testing for Auto Correlation c. Poker Test d. Gap Test	2 1 1 1	
4. Verification and Validation of Simulation Model	1. Model Building 2. Verification of Simulation Model 3. Calibration and Validation of Models	1 2 3	
5. Analysis of Simulation Output	1. Nature of Problem 2. Estimation Methods 3. Simulation Run Statistics 4. Replication of Runs 5. Elimination of Internal Bias	1 1 2 2 2	
6. Simulation Language	1. Basic Concept of Simulation Tools 2. Discrete System modeling and Simulation – Introduction to GPSS 3. Continuous System Modeling and Simulation – Introduction to CSMP 4. Data and Control statement on CSMP 5. Hybrid Simulation 6. Feedback Systems: typical applications(Auto pilot)	1 3 3 1 1 1	