Computer Modeling and Simulation - CS4041

General Information

Course Code: CS 4041

Course Title: Computer Modeling and Simulation

Total Credits: 3

Instructor: Engr. Sara Rehmat

Email: sara.rehmat@nu.edu.pk

Contact: (091) 111-128-128 (Ext:147)

Grade Distribution:

Assignments (around 3): 5%

Presentations and Reports): 5%

Quizzes (weekly): 10%

Sessional-1: 15%

Sessional-2: 15%

Finals: 50%

Reference Books:

Introduction to Computational Science: Modeling and Simulation for the Sciences by Angela B. Shiflet, George W. Shiflet

Course Policies:

a. Grading Policy:

Relative (InterQuartile Range**)** method will be used for grading.

b. Attendance Policy:

Minimum 80% attendance is required for appearing in final exams. Anyone joining class later than 20 minutes will be marked absent.

c. Grades Distribution:

Assignments: 10%

Quizzes: 10%

Sessional Exams: 30%

Final Exam: 50%

Reference Books:

● Introduction to Computational Science: Modeling and Simulation for the Sciences by Angela B. Shiflet, George W. Shiflet

● Modeling and simulection fundamentals: theoretical underpinnings and practical domains by Sokolowski, J. A., & Banks, C. M.

Course Learning Outcomes:

1. Understand basic concepts of Computer Modeling and Simulation
2. Apply different modeling and simulation techniques to different types of real-world systems
3. Analyze the results of simulation by using simulation tools
4. Model uncertainty and randomness using different techniques

Course Outline:

Week	Topics
1	Course Orientation, Introduction to Computer Modelling and Simulation, Types of model, Types of Simulation
2	Agent Based Modeling and Simulation
3	Models from Netlogo Models Library
4	Cellular Automata
5	Continuous Simulation: Unconstrained Growth Model
6	**Sessional-1**
7	Runge-Kutta 4, Constrained Growth Model
8	Competition, Predator-Prey Model
9	Spread of Infectious diseases - SIR Model
10	Lipsitch Model of SARS
11	**Sessional-2**
12	Discrete Event Simulation: Queueing Model
13	Discrete Event Simulation using SimPy
14	Monte Carlo Simulation
15	Applications of Monte Carlo Simulation
16	Random Walk, Psuodorandom Number Generator