NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF SCIENCES
COMPUTER SCIENCE PROGRAM

CC562 – MODELING AND SIMULATION

I. GENERAL INFORMATION

CODE	: CC562 – Modeling and simulation
SEMESTER	: 9
CREDITS	: 04
HOURS PER WEEK	: 6 (Theory – Laboratory)
PREREQUISITES	: CC201 Introduction to object-oriented programming CC441 Artificial intelligence CM334 Numerical analysis I
CONDITION	: Mandatory

II. COURSE DESCRIPTION

Explain the benefits of simulation and modeling in a number of important application areas.
Demonstrate the ability to apply modeling and simulation techniques to a range of problematic areas.
Evaluate a simulation, highlighting the advantages and disadvantages.

III. LEARNING UNITS

1. Definition of simulation and modeling

I: Definition system and components.
II: Stochastic, continuous and discrete systems activities.
III: Modeling of the system.
IV: Types of models.
V: Static and dynamic physical models.
VI: Static and dynamic mathematical models.
VII: Complete social model
VIII: Types of study systems.

2. System simulation

I: System simulation.
II: Need for simulation
III: Basic nature of the simulation.
IV: Simulation techniques.
V: Simulation comparison and analytical methods.

VI: Simulation system types.
VII: Real time simulation.
VIII: Hybrid simulation.
IX: Simulation of search problems.
X: Single-server queue system and an inventory problem.
XI: Monte-Carlo simulation.
XII: Distributed Lag model,
XIII: Cobweb model.

3. Simulation of continuous systems

I: Simulation of continuous systems.
II: Analog vs digital simulation.
III: Simulation of a water reservoir system.
IV: Simulation of a servo system.
V: Simulation of an automatic pilot.
VI: Simulation of a discrete system.
VII: Fixed-time vs. event-to-event model.
VIII: Generation of random numbers.
IX: Randomness test.
X: Monte-Carlo computation vs stochastic simulation**.**

4. Dynamic systems

I: Dynamic systems.
II: Exponential growth models.
III: Exponential decay models.
IV: Logistic curves.
V: Dynamical system diagrams.
VI: World model.

5. PERT network simulation

I: PERT network simulation.
II: Calculation of the critical path.
III: Uncertainties in the duration of the activity.
IV: Allocation of resources and considerations
V: Simulation languages.
VI: Object-oriented simulation.

IV. BIBLIOGRAPHY

- Geoftrey Gordon, “System Simulation”, PHI.
- Narsingh Deo, “System Simulation with digital computer”, PHI.
- Averill M. Law, W. David Kelton, “Simulation Modelling and Analysis”, TMH.