

Course Outline

Course Title Modelling and Simulation

Course Code COMP 315

Overall Course Aim(s) Introduce Students to modelling and simulation concepts

- **Teaching Methods**
- Assigned Readings
- Practical Sessions
- Lectures
- Research Assignments

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Course Information

Course Description Understand the fundamental principles of developing a model and conducting simulation.

COMP 317: Modelling and Simulation

The course will cover both analytical methods and simulation techniques applied in performance modelling of communication systems and network. By the end of the course student appreciate modelling and simulation. Some of the topics to be covered are introduction to simulation method and technique, illustrated with appropriate programs, the concept of simulation, reasons for simulation, simulation problems and models, planning computer simulation, continuous system simulation programs and their applications. Other topics may include discrete system simulation, application in stochastic simulation, traffic flow, traffic control, storage systems and inventory.

Indicative Content

- A. Acquire an understanding of System Modelling and Simulation
- B. Carry Out Basic System Simulation and Modelling Task
- C. Acquire more hands-on capabilities of Modelling and Simulations.

Learning Outcomes

Learning Objectives

Upon the completion of this course, the student is expected to be able to carry out basic system and concepts of operating systems such as:

- Understand the concepts of Modelling and Simulation
- Understand the rationale behind system modelling and simulation
- Be able to explain modelling and simulation concepts
- Proficient in system/network modelling and simulation.

Resources:

Required Software/Tools:

- Modelling Tools- SSADM-download and install-SSADM (<https://www.edrawsoft.com/ssadm>).
- Simulation Tools-Cisco packet tracer, GNS, NS3, etc.

Prescribed Textbooks:

- a. Ian Sommerville, Software Engineering, 9th Edition, Addison Wesley, 2011. **Chapter 5 (System Modelling).**
- b. Law, A. (2014). *Simulation Modelling and Analysis*. (5thed.). New York, NY: McGraw-Hill Education.
- c. Imboden, D. M., & Pfenninger, S. (2013). Introduction to Systems Analysis: Mathematically Modeling Natural Systems. London, U. K.: Springer.
- d. Law, A. and Law, A. M., (2007). *Simulation Modelling and Analysis with Expert Software*. (4thed.). New York, NY: McGraw- Hill.
- e. Any Good book on modelling and Simulation.

Summative Assessment

Assessment

Type	Weighting	Remark
Attendance	5%	Mandatory
Weekly Tests	5%	“
Mid-Semester Exams /Presentations	30%	“
Final Examination	60%	“
Total	100%	“

Period	Topic/Lecture content	Task/Assignments
Week 1	Introduction: Introduce students to the field of system modelling and Simulation.	N/A
Week 2	Simulation model Taxonomy: <ul style="list-style-type: none"> • Deterministic model (Static, dynamic, continuous, discrete) • Stochastic model (Static, dynamic, continuous, discrete) 	Class Assignment
Week 3 & 4	Unified Modelling languages: <ul style="list-style-type: none"> • Context Models • Interaction models 	Practical session

Week 5	<ul style="list-style-type: none">• Structural Models• Behavioural models• Model-driven engineering	Assignment
Week 6 & 7	Practical implementations of UML models using SSADM	Practical session
Week 8 & 9	Practical simulation task using packet tracer/GN3, Ns2.	Practical session
Week 10	Mid-Semester Exam/Presentations	Practical sessions
Week 11 & 12	Alternative Approaches to Modelling and Coding Simulations	Assignment