Course Description: Modeling and computer simulation of discrete systems using discrete event simulation techniques. Application to the performance evaluation and modeling of computer networks and networking protocols. Study and use of the OPNET simulation system.

Prerequisites: CISC 450 / CPEG 419 or CISC 650 / ELEG 651 (undergraduate and graduate courses respectively on Computer Networks), or Instructor Permission. Desired Background: Basic knowledge of probability theory and statistics.


Goals: The aim of this course is to provide the student with a good understanding of the fundamental concepts and principles of discrete event simulation as applied to the simulation of computer networks and protocols. The students will learn how to use the OPNET IT Guru and Modeler software for such simulations. The course will rely heavily on labs and practical simulation exercises involving a variety of networking technologies and protocols.

Learn how to use the OPNET software for network simulation and add to your marketable skills. OPNET is widely used in industry, government, and defense enterprises.

Undergraduate CIS students may use this course as a technical elective or as a concentration course.

Contents:

1. Introduction to simulation principles and to OPNET IT Guru and Modeler.
2. Principles of discrete event simulation.
3. Analysis of simulation results: basic statistical analysis.
4. Simulation of applications and modeling of various traffic types: HTTP, FTP, Email etc.
5. Simulation of transport protocols: TCP and UDP, reliable data transfer, flow control and error control, congestion avoidance.
6. Simulation of routing protocols: Distance-vector (RIP) and Link state (OSPF).
7. Simulation of LAN protocols: Ethernet, wireless LAN (802.11).