

Total Credits: 03

Lecture / Recitation / Discussion Hours: (3-0)

Course Objective:

The course aims to provide analytical tools that serve as a basis for addressing several performance analysis and engineering problems while at the same time presenting the state-of-the-art in computer communication protocols.

- Create appropriate models of computer systems and computer networks.
- Use analytic and/or simulation methods to evaluate the performance of computer systems and computer networks
- Overview of current research topics and commercial development in wireline and wireless networks.

Course Outline:

Introduction to performance analysis on computer networks

- Probability Review
- Simulation Techniques
- Markov chains
- Queuing theory
 - Basic Queuing Theory – M/M/1, M/M/1/K queues
 - Basic Queuing Theory – M/M/m, M/M/m/B, M/M/m/m queues
 - Basic Queuing Theory – M/G/1 queues
 - Advanced Queuing Theory – M/G/1 queues with vacations and priorities
 - Advanced Queuing Theory – G/G/1 and G/G/m queues
 - Advanced Queuing Theory – Discrete-time queues
 - Queuing Networks – I
 - Queuing Networks – II
 - Queuing Networks - III
- Network traffic modeling
- Quality of Service
- Traffic engineering and MPLS
- Failure protection, mesh restoration and reliability analysis

Prerequisites:

Good knowledge of Communication Networks and Probability.

Required Textbook:

1. **System Modeling and Analysis: Foundations of System Performance Evaluation, 1/E**
Kobayashi & Mark Prentice Hall 2009.
2. Dimitri Bertsekas and Robert Gallager, Data Networks, 2e, Prentice Hall, 1992.