

ECE 5566 Network Architecture and Protocols (3C)

Performance evaluation, design, and management of networks. Use of queuing and other analytical methods, simulation, and experimental methods to evaluate and design networks and protocols. Network management architectures and protocols.

What is the reason for this course?

Computer networks and the associated protocols form the basis for modern data communications that is at the heart of information technology and the Internet. Knowledge of networking and protocols is important not only for networking professionals, but also for engineers and computer scientists concerned with communications, computer systems, or distributed applications. The design, deployment and management of effective computer networks and protocols requires the ability to analyze the performance of network designs, analyze the efficiency and correctness of protocols, and use network management tools to determine current network operating parameters. This course sequence provides requisite knowledge for network and protocol researchers, network and protocol designers, and advanced network managers.

Typically offered: Spring. Program Area: Computers.

Department Syllabus Information:**Major Measurable Learning Objectives:**

- Use analytical models to evaluate the relative performance of single and multiple queue systems used to model networks and protocols;
 - Describe traffic models used for packet-switched and circuit-switched traffic and discuss the concept of self-similarity and its applicability to traffic modeling;
 - Design simulation experiments, develop traffic models, develop network models, and analyze results for evaluating the performance of queues, local area networks, internetworks, and protocols;
 - Apply modeling and network design techniques, including graph theory principles, to design access and backbone networks based on performance objectives and design constraints; and
 - Describe the operation of common network management protocols and explain the use of network management tools and network monitors to determine network performance and operational problems.
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Course Topics	
Topic	Percentage
Approaches and metrics for evaluation; synergies among evaluation, design and management	5%
Queuing theory, M/M/1, M/M/1/K, M/M/m, M/M/ ∞ , M/M/m/m, M/G/1 and M/G/1 with priority models	15%
Open and closed networks of queues	5%
Discrete-time queuing systems	5%
Simulation models for network and protocol design and performance analysis	15%
Traffic characterization and modeling; self-similarity	10%
Network bandwidth assignment and bandwidth management	10%
Graph theory and application to access and backbone network design	20%
Network Management and SNMP	15%