

ADVANCED COMPUTER NETWORKS**Instructor:**

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Objectives:

The field of telecommunications and networking has seen a rapid transformation in the last two decades. The volume of data transmission is about to overcome that of voice traffic. E-mail, WWW and other Internet based applications have changed the way the information is exchanged and distributed. The impact of the information revolution made possible by these technical advances can be seen in all aspects of industry, education and entertainment. The rapid evolution of the Internet is sustained by advances in transmission technologies (e.g. fiber optics, wireless LANs), data processing hardware (e.g. PCs, Workstations, embedded processors), and protocols (e.g. IP, VoIP, Mbone). Convergence of voice and data poses new challenges and opportunities for the networking industry. This course attempts to provide an understanding of the broad landscape of existing and emerging networking technologies.

The objectives of the course are as follows:

1. Provide a system level perspective of the state of the art of high speed networking
2. Investigate how the multiple physical networks that form the Internet operate as a coordinated system
3. Introduce basic network programming concepts, and
4. Introduce the challenges as well as technical and fundamental limitations faced by network researchers and designers.

Technologies, services and protocols that will be discussed in detail include LANs (**FDDI**, **Fast Ethernet**), **SONET** (**Synchronous Optical Network**), **ATM** (**Asynchronous Transfer Mode**), and **TCP/IP protocol suite**.

Prerequisites:

An undergraduate course in Data Communications (ex. CS 457.), and experience with C, C++ or Java

Texts:

Selected conference and journal papers (*Class handouts, On-line documents*)
S. Keshav, "An Engineering Approach to Computer Networking: ATM Networks, the Internet and the Telephone Network," Addison Wesley, 1997 (*Recommended*)
Selected books available on reserve at the Morgan Library.

Topics:

1. Introduction to Computer Network Architectures and Protocols
 - Evolution of Voice and Data Networks
 - Layered Network Architectures
2. Medium Access Control Protocols and Logical Link Layer Protocols
 - LANs and MANs (IEEE 802.x series, FDDI and FDDI-II, DQDB,...)
 - Priority Schemes
 - MAC Standards for Wireless Networks
3. Internetworking
 - TCP/IP Protocol Suite
 - Addressing and Routing
 - Implementation and Performance Issues
4. Introduction to Socket Programming
5. Asynchronous Transfer Mode (ATM)
 - Concepts, Protocols, Standards and Performance
6. Switching Techniques and Switch Fabrics
7. Future of Networking

Grading:

Programming assignments	40%
Minute papers	15%
Paper/project & presentation	25%
Homework and Quizzes	20%

- All the programming assignments have to be completed.
- Each student is required to write a term paper and make a presentation on a course related topic. Alternatively, you may carry out a simulation of a protocol, or implement a protocol. Such a project may be a group project involving two students.
- A minute paper is a short writeup addressing the following questions:
 - 1) What are the significant things you learned in the lecture?, and
 - 2) What question is uppermost in your mind at the end of the lecture?E-mail your minute paper to the instructor prior to the next lecture, with 'Subject: MPmmdd Your name,' where mmdd is the date of the lecture (Ex: MP0824 John Doe).

Since each minute paper is based on a lecture, you must not submit one for a lecture that you did not attend.