Course Goals

- learn *design* and *implementation* of computer communication networks, and their protocols, services, and applications
- both theory and practice
- hands-on experience
- case studies: learning through examples
- fun, interactive learning experience
Course Mechanics

Co-lectured 653, 453
  juniors, seniors, grad students
  separate undergrad, grad assignments, exams

Prerequisites:
  OS, architecture
  programming skills

Workload:
  4 written hw's
  3 programming assignments
  midterm, final
Course Materials

- **recommended texts:**
  - Computer Networks, A. Tanenbaum, 3rd ed.
  - *Data Networking and Internet Protocols*, K. Ross, J. Kurose
  - (http://www.seas.upenn.edu/~ross/book/Contents.htm)

- **videotapes:** of each lecture on reserve in Physical Sciences Library

- class WWW site
  - all class materials: notes, hw's, class info

- broadcast email list: cs653@cs.umass.edu
Course Outline

Introduction
- networks, network applications
- layered network architecture
- brief history

Network Applications
- applications and their requirements
- examples: email, WWW, teleconferencing

Network applications programming
- issues
- socket programming and other API's
- OS issues

The presentation layer
- the representation problem
- ASN.1: abstract syntax, encoding, use
Course Outline (cont.)

The transport layer
- data transfer over unreliable channels
- setting up connections
- congestion and flow control
- multiplexing
- quality of service
- OS implementation issues
- case studies: UDP, TCP, ATM ABR

The network layer
- service models
- link state, distance vector routing
- broadcasting
- intradomain routing: ES-IS, IS-IS, RIP, OSPF
- interdomain routing: IDRP, BGP
- IP, ICMP
- routing, switching
- router case study
Course Outline (cont)

Data link control, LAN's
- point-to-point DLC: HDLC, PPP
- multiple access Ethernet, IEEE802.*
- address resolution: ARP
- switched LANs, ATM LANS
- network interface: OS issues
- bridges, hubs

Physical layer
- attributes of different physical media
- mixed media in networks
Course Outline (cont).

Putting it all together
- internetworking
- IP over ATM
- following a packet

Network Management
- issues
- case study: SNMP

Security
- cryptography
- authentication
- public key encryption
- case study: PGP

Future directions
- next generation Internet
- service models
- reservation protocols
- mobile networks