Intermediate Networking

University of Puerto Rico
Department of Computer Science

January 2004

Course Information

MEETING TIMES

MTWRF 9:00am - 12:00 noon, Room TBA

INSTRUCTOR

Jim Griffioen, griff@netlab.uky.edu

COURSE OBJECTIVES

This course builds on network concepts and ideas taught in the introductory computer networks course (Telecommunications I). The course begins with a review of network architectural models, MAC-level services, basic Internetworking technology and protocols, and transport layer services. We will then take a closer look at more complex issues such including network routing approaches, end-to-end issues including reliability, (partial) ordering, congestion control, QoS, and buffer management, and we will study recent security approaches such as firewalls, network address translation, intrusion detection systems, and anti-spam systems. Students will be required to implement programming projects written in the C/C++ language on Unix systems.

TEXTBOOKS

- Computer Networks and Internets, by Douglas E. Comer (CD-ROM by Ralph Droms), Prentice Hall, 2001. FOURTH EDITION
- (Highly Recommended) TCP/IP sockets in C: Practical Guide for Programmers, Michael J. Donahoo and Kenneth L. Calvert, Morgan Kaufmann, 2000

ASSIGNMENTS/TESTS

- Exams/Quizes: TBD
- Homework, Labs, and Programming Exercises: There will be a several homework and programming assignments. Programing projects must be done in the C or C++ programming languages on Unix systems and will be done individually by each student unless otherwise stated. Experience with C or C++ is assumed and will not be taught in this course. Basic operating system programming skills (e.g., fork/exec) are a prerequisite.
Class Web Pages

- **On-line Documents**: All documents for this class will be online and accessible via the web. The home page for this class can be found at URL http://protocols.netlab.uky.edu/ griff/classes/uprsc. The syllabus, all programming project descriptions, source code, examples, and other material will be available via this home page.

- **Electronic Submission**: Similarly, all your homework must be submitted electronically, by “tar”ing up your files and submitting them to griff@netlab.uky.edu as a base64 encoded attachment.

GRADING

The course will be graded Pass/Fail based on your ability to demonstrate mastery of the material.

ADDITIONAL REFERENCES


*TCP/IP Illustrated*, Richard W. Stevens, Addison Wesley, 1994

Topics

The following is a tentative list of the topics that will be covered.

1. Overview of basic networking concepts:
   - Physical layer and media
   - Data link layer framing, error recovery, multiplexing, and address
   - Network layer addressing, encapsulation, fragmentation
   - Transport layer datagrams and streams, flow control
   - Session layer establishment, authentication, synchronization
   - Presentation layer data transformations
   - Application layer file transfer, web protocols, remote login

2. Internet Routing Approaches
   - Distance vector
   - Link state
   - Label/tag switching
   - Multicast routing

3. End-to-End Issues
   - Reliability guarantees
   - (Partial) ordering
   - Congestion control
   - Congestion avoidance
   - Quality of Service (QoS)
   - Queing and buffer management

4. Security and User-level Services
   - Firewalls
   - NAT
   - Tunnelling
   - IDS
   - Mail and unified messaging
   - Web services
   - Peer-to-Peer Services