

## **IT 246 Introduction to Networks (exists as CSIT 246)**

### **Course Description**

We will study basic data communication and networking concepts for LAN and WAN: network protocols with emphasis on Ethernet, PPP, TCP/IP, and WWW protocols, and mobile and wireless networks. Network applications include Telnet, ftp, email, distributed file systems, and client-server applications. We survey network security issues. We will do hands-on network simulation and network sniffing exercises to see how these technologies work in practice.

### **Text**

- William Stallings. *Business Data Communications*. Pearson Prentice-Hall, 2004. Or, William Stallings. *Data and Computer Communications*. Pearson Prentice-Hall, 2006.
- *Accompanying Lab Manual That Can Be Used with OPNET's IT Guru Academic Edition*
- An alternative text: Diane Barrett, Todd King. *Computer Networking Illuminated*. Jones and Bartlett, 2005.
- Ethernet LAN Supplements:  
<http://www.howstuffworks.com/ethernet.htm>  
<http://www.ethermanage.com/ethernet/ethernet.html>  
[http://www.cisco.com/univercd/cc/td/doc/cisintwk/ito\\_doc/ethernet.htm](http://www.cisco.com/univercd/cc/td/doc/cisintwk/ito_doc/ethernet.htm)

### **Projects**

Students will do hands-on projects, chosen from the following. Students may download the OPNET simulator and the Wireshark sniffer onto their own PCs.

Using the OPNET Network Simulator

(see [http://www.opnet.com/university\\_program/itguru\\_academic\\_edition/](http://www.opnet.com/university_program/itguru_academic_edition/)):

- Shared Ethernet Networks: to determine the throughput of a shared Ethernet network under load.
- Switches versus Hubs: to examine the change in throughput in a local area network when upgrading from a hub to a switch.
- Routing Protocols: to simulate the behavior of several routers running the RIP routing protocol and to learn how to use routing tables to find paths in a network.
- QoS: to examine the effects of applying different router queuing policies to quality of service.
- Traffic Shaping: to examine the effects of traffic shaping on router performance.
- TCP Throughput: to examine the throughput of a TCP connection as the flow control window size is varied.
- Firewall performance: to examine the effect of firewall filtering on application response time.

Students may also do projects using Wireshark, an open-source Network Sniffer that looks at actual traffic to and from one's own computer

(see <http://www.wireshark.org/>):

- Observing DHCP in action.
- Observing DNS and NSLookup

- Ethernet and ARP capturing and analyzing Ethernet frames.
- Observing the basic HTTP GET/Response action.
- Playing with Ping and ICMP.
- Capturing IP packets from an execution of traceroute.
- Investigating SSL.
- Capturing a bulk TCP transfer from your computer to a remote server.

## Topics

1. Business Information.
2. Distributed Data Processing. Case Study: MasterCard International.
3. Internet History and Architecture.
4. TCP/IP and OSI. Case Study: Florida Department of Management Services.
5. Internet-based Applications: SMTP, HTTP, telephony.
6. Client-server and Intranet Computing. Case study: ING Life.
7. Internet Operation: addressing, routing protocols, speed and quality of service.
8. LAN Architecture and Protocols.
9. Ethernet and Fiber Channel. Case Study: Carlson Companies.
10. Wireless LANS: IEEE 802.11 and Bluetooth. Case Study: St. Luke's Hospital.
11. Wide Area Networks: circuit switching and packet switching. Case Study: Staten Island University Hospital.
12. Wireless WANS. Case Study: Choice Hotels International.
13. Network Security. Case Study: The Hacker in All of Us.

## Grading

Project Reports 40%    Exams: 60% (20% each)

## Accommodations

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, M-1-401, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of Drop/Add period.

## Student Conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct as delineated in the catalog of Undergraduate Programs, pp. 44-45, and 48-52. The Code is available online at: [http://www.umb.edu/student\\_services/student\\_rights/code\\_conduct.html](http://www.umb.edu/student_services/student_rights/code_conduct.html)