Syllabus for CSE 5231 (Computer Networks)

Course Goal: This is a course in data communication networking intended for students in CS and Engineering whose long-term goals may include design and development of networking hardware or software products as well as design and implementation of enterprise or service-provider networks. It introduces the concept of good network design using protocol and function layering. It introduces the principal networking architectures such as TCP/IP, Frame Relay, ATM. It introduces the major roles of network components such as hubs, routers, and switches. It interweaves the corresponding control and performance issues throughout including throughput, delay, bandwidth management, congestion control, error control, sliding windows, retransmission strategies, contention resolution. It also includes a section on network traffic analysis: methodologies and known results.

Prerequisites: Students should have completed a course in Probability and Statistics and two semesters of Calculus. We will review probability and statistics concepts as we need them.

Instructor: Dr. G. Marin. Email: gmarin@fit.edu. Phone: 321-674-7559
Office hours: Tuesday 2pm-3pm and Thursday 10:30am – noon in Olin 245 E/C. You may also make an appointment either by seeing me after class or sending me an email. (I will usually have time on Wednesday.) You may also ask questions by email.

Course Content (Subject to change)

Introduction and Foundation
  Applications
  Requirements and Constraints
  Basics and Terminology
  Network Architecture and Reference Models
  Example Networks
  Performance Issues
  Providing Multiple Access

Tools from Probability and Stochastic Processes (review as needed)
  Sample Space, Events, Probability Space, Discrete RVs and Important Distributions, Continuous RVs and Important Distributions, pdf’s, joint pdf’s, Distribution Functions, Expected Values and Higher Order Moments, Conditional Probabilities, Independence…

Direct Link Networks
  Types of Links
  Signaling and Shannon’s Theorem
  Framing, Error Detection, Error Correction
  Retransmission Strategies
  Sliding Window Protocols
  Important LAN standards
  Ethernet MAC and Efficiency
  Workstation and Adapter Architecture and Performance

Midterm Test October 15, 2009
Packet Switching
  Switching and Forwarding
  Routing, Source Routing, Virtual Circuits
  Bridges and LAN Switches
  ATM and Frame Relay
  Performance Issues

Internetworking
  Network Layer Overview
  Introduction to IP
  IP Addressing, Subnetting, Routing Tables
  ARP and Routing Algorithms
  ICMP and Error Reporting
  MPLS
  Topics in Network Design
  Performance Analysis

End-to-End Protocols
  TCP Segment Structure and Protocol Overview
  UDP Overview
  Introduction to TCP Congestion Control

Congestion Control and Resource Allocation
  Resource Allocation Issues
  Introduction to Queuing Analysis
  Congestion Control and Avoidance

Introduction to Traffic Modeling (Time Permitting)

   Final Exam (comprehensive): Wednesday, December 9, 3:30pm – 5:30pm

Test Policy: Every effort will be made to hold the mid-term and final as scheduled. Students must take both tests at the appointed time or receive a grade of 0 for the test. Only verifiable emergencies will be considered as exceptions to this policy. In case of such an emergency, you must contact Dr. Marin as soon as possible to avoid receiving a 0 grade. You must speak with Dr. Marin BEFORE any test or exam that you must miss unless the absence was completely unpredictable (such as a car accident on the way to the exam!)

Grade

Your grade in the course will be determined as follows:
Mid-term Test: 30%
Final Exam: 40%
Homework and Class Participation: 30%

A: 90 – 100; B: 80 - 89; C: 70 – 79; D: 60 – 69; F: Below 60. (I may choose to vary this for borderline grades, but only to the student’s benefit.)

Note: No computers or cell phones in class. Five point penalty off FINAL AVERAGE for any such use.
Text

Computer Networks, 4th Edition by Larry L. Peterson and Bruce S. Davie

Class Policy: You must work alone during the tests. Any talking during the mid-term test or the exam will be assumed to be an attempt for an unfair advantage and will result in a 0 grade for that test and may be referred elsewhere in the University for further action (as will any appearance of cheating such as looking at a neighbors test, passing papers or other materials, or using books or notes or calculator during a test unless approved before the test.) A second incident will result in an F for the final course grade. Any disruptive behavior in class (talking, etc.) may result in a lower final grade.

Reading and Homework Assignments: Will be given during class periods. Assignments will be posted on the web. You may work in teams of 2 or 3 people (maximum of 3) on each of the homework assignments. Each student must turn in his/her own paper and MUST list the names of his/her partners in addition to his/her own. You must be prepared to explain your work if requested.

Lecture Materials: Will be available via the web - typically in pdf format. Presentation slides will usually be available within a day or so after the material for that section is complete. Any such material is provided for educational purposes only and cannot be further reproduced or distributed without possible violation of copyright laws.

G. Marin