ELEC 8120/8126 - Principles of Network Performance Analysis

Catalog Data: ELEC 8120/8126. PRINCIPLES OF NETWORK PERFORMANCE ANALYSIS (3) Lec. 2. Pr., ELEC 5120 or ELEC 6120, and ELEC 7410. Data network performance analysis, queueing systems, admission control, network traffic modeling, network calculus, flow and congestion control, wireless network analysis, and network simulation.


References:

Coordinator: Shiwen Mao, Assistant Professor, Electrical and Computer Engineering

Course Objectives:
1. Address the analytical aspect of data networking
2. Provide a big picture of the theoretical developments in communication networks
3. In-depth treatment of advanced analytical techniques for communication networks
4. Prepare graduate students for conducting research in the wired/wireless networking area. Helpful for both hands-on and theoretical research.

Prerequisites by Topic:
1. Telecommunication/data networks
2. Probability & stochastic processes

Days and Time:
1. Class: Tuesday and Thursday, TBA
2. Office hour: TBA

Topics & Class Schedule (75 minute classes):
1. Overview of stochastic process (1 class)
2. Single server queues: M/M/1, M/G/1, M/D/1, G/M/1, and fluid queues (8 classes)
3. Multi-server queues: M/M/m, M/G/E, and multi-stage queues (4 classes)
4. Queueing networks (2 classes)
5. Effective bandwidth and admission control (3 classes)
6. Traffic modeling: self-similarity and long range dependence (3 classes)
7. Envelope process and network calculus (2 classes)
8. Flow and congestion control (2 classes)
9. Multiple access networks (2 class)
10. Network simulation (1 class)
11. Review/exams (3 classes)

**Student Performance Evaluation:**
- Midterm exam 40%
- Homework 30%
- Final exam/Project 20%
- Quizzes 10%

**Homework:**
Problems from the reference books, as well as designed by the instructor, will be assigned throughout the semester to reinforce the class material.

**Project:**
A list of recommended projects will be provided at the beginning of the semester. Each student is required to complete one of the projects, with assistance from the instructor.

**Class Attendance:**
Class attendance is strongly encouraged, but will not be accounted for in the course grade.

**Unannounced Quizzes:**
Unannounced quizzes and their effect on course grade will be an integrated part of this course. No make-ups will be permitted for missed quizzes.

**Special Accommodations:**
Any student requiring special accommodations should come by my office within the first two days of class, bringing your letter from the Office of Students with Disabilities.

**Academic Honesty:**
Please carefully read the Student Academic Honesty Code posted at: [http://www.auburn.edu/academic/provost/story.html?1149111436000133](http://www.auburn.edu/academic/provost/story.html?1149111436000133), which will be strictly followed throughout this course.

**Contribution of Course to Meeting the Professional Component:**
- Engineering topics: 3 credits
  - 66.6% engineering science (2 credits)
  - 33.4% engineering design (1 credit)

**Prepared by:** Dr. Shiwen Mao, **Date:** July 16, 2007