Course Number: CENG 510 Section 7, Safari 04326
Time and Place: Tues. and Thur., 11:00 AM - 12:20 PM, ENGR 304
Catalog Description: This course presents performance-modeling tools for telecommunications networks, computer networks, wireless networks, and broadcast networks.

Textbook: None. Instructor's notes and various handouts.
Coordinator: Dale R. Thompson, Assistant Professor of Computer Science and Computer Engineering

Goals: The main goals include calculating the blocking probability for circuit switching networks, the average delay for packet switching networks, and the maximum throughput for wireless networks and broadcast networks.

Topics:

- Probability review
- Circuit switching networks
  - Probability of blocking
- Packet switching networks
  - Queueing Theory
  - Mean Value Analysis
  - Routing
- Traffic analysis
  - Call admission control
    - Fluid-flow model
    - Gaussian model
  - Self-similar traffic
- Topology Design
  - Heuristics
  - Simulated annealing
  - Genetic algorithm
- Wireless networks
  - Aloha
  - Slotted Aloha
- Broadcast networks
  - CSMA
  - CSMA/CD
  - Ethernet
- Network Security (if there is time)

Prerequisites by topic: Graduate standing and strong probability and statistics background.
Grading Policy:
Midterm 25%
Final Exam 25%
Homework 25%
Written Abstracts 25% (see below)

Abstracts: Throughout the semester a technical paper will be distributed to be discussed the next class period. One student will be responsible for preparing a brief presentation on the paper. The next class period the one student will give the presentation and as a class we will discuss it. All students, including the one presenting, will write and turn in an abstract of the paper that is less than one page long. No abstracts greater than one page will be accepted. I will grade the abstracts. I anticipate that we will do this four to eight times throughout the semester.

Deadline Policy: All assignments will be given with a strict deadline, and students are required to submit their assignments on or before the deadline. Homework will be collected at the start of the class on the due date, and late submissions will not be accepted. In case of extenuating circumstances, students are advised to contact the professor as soon as practical. You are encouraged to discuss the course and the assignments with each other; however, your exams and homework should be your own work.

Academic Dishonesty: Students who violate University standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the University. Since dishonesty in any form harms the individual, other students and the University, policies concerning academic dishonesty will be strictly enforced. I expect you will familiarize yourself with the University's Academic Dishonesty Policy which may be found in your undergraduate catalog.
Students who graduate from the Computer Engineering program at the University of Arkansas shall possess:

I. Program Outcomes specified by Accreditation Board for Engineering and Technology (ABET) General Criteria

   a. an ability to apply knowledge of mathematics, science, and engineering
   b. an ability to design and conduct experiments, as well as to analyze and interpret data
   c. an ability to design a system, component, or process to meet desired needs
   d. an ability to function on multi-disciplinary teams
   e. an ability to identify, formulate, and solve engineering problems
   f. an understanding of professional and ethical responsibility
   g. an ability to communicate effectively
   h. the broad education necessary to understand the impact of engineering solutions in a global and social context
   i. a recognition of the need for, and an ability to engage in life-long learning
   j. a knowledge of contemporary issues
   k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

II. Program outcomes specified by ABET program criteria for Electrical, Computer, and Similarly Name Engineering Programs

   l. a knowledge of mathematics through differential and integral equations, discrete mathematics, and probability and statistics
   m. a knowledge of basic sciences
   n. a knowledge of engineering sciences
   o. a knowledge of computer science

III. Program outcomes specified by the University of Arkansas Computer Engineering Program (Approved October 2, 2001)

   p. a knowledge of computer organization and architecture
   q. a knowledge of system software principles, particularly of modern operating systems
   r. a knowledge of the fundamental relationships between hardware and software components and the ability to exploit these relationships to design effective solutions to computer engineering problems
   s. an understanding both of hardware and software techniques sufficient to design, build, and test complex digital systems
Students who graduate from the **Computer Science** program at the University of Arkansas shall possess *(Approved October 2, 2001)*:

- t. a knowledge of computer organization
- u. the knowledge and skills required to design, develop and produce high quality computer software
- v. the knowledge and ability to abstract general principles such as capturing recurring patterns from concrete examples or data to apply inductive reasoning in formulating solutions of computational problems
- w. the knowledge of programming language design and implementation issues and key paradigms of modern programming languages
- x. a knowledge of system software principles, particularly of modern operating systems

**Relationship of Network Performance Evaluation to program outcomes:**

(a)(b)(c)(e)(l)(r)(s) Students are required to apply probability and statistics to determine the blocking probability in circuit switching networks. Students are required to determine the average delay in packet switching networks. Students are required to determine the maximum throughput in wireless and broadcast networks.

(i) The need to stay current is reinforced through class discussions on current and future developments.

(j) Current issues in networking are used as examples such as wavelength division multiplexing.

Prepared by:_______________________________________Date:_________________
Fifteen Definitions of Academic Dishonesty

Academic dishonesty involves acts that may subvert or compromise the integrity of the educational process at the University of Arkansas. Included is an act by which a student gains or attempts to gain an academic advantage for himself or herself or another by misrepresenting his or her or another's work or by interfering with the completion, submission, or evaluation of work. These include, but are not limited to, accomplishing or attempting any of the following acts:

1. Altering of grades or official records.
2. Using any materials that are not authorized by the instructor for use during an examination.
3. Copying from another student's paper during an examination.
4. Collaborating during an examination with any other person by giving or receiving information without specific permission of the instructor.
5. Stealing, buying, or otherwise obtaining information about an unadministered examination.
6. Collaborating on laboratory work, take-home examinations, homework, or other assigned work when instructed to work independently.
7. Substituting for another person or permitting any other person to substitute for oneself to take an examination.
8. Submitting as one's own any theme, report, term paper, essay, computer program, other written work, speech, painting, drawing, sculpture, or other art work prepared totally or in part by another.
9. Submitting, without specific permission of the instructor, work that has been previously offered for credit in another course.
10. Plagiarizing, that is, the offering as one's own work the words, ideas, or arguments of another person without appropriate attribution by quotation, reference, or footnote. Plagiarism occurs both when the words of another are reproduced without acknowledgment or when the ideas or arguments of another are paraphrased in such a way as to lead the reader to believe that they originated with the writer. It is the responsibility of all University students to understand the methods of proper attribution and to apply those principles in all materials submitted.
11. Sabotaging of another student's work.
12. Falsifying or committing forgery on any University form or document.
13. Submitting altered or falsified data as experimental data from laboratory projects, survey research, or other field research.
14. Committing any willful act of dishonesty that interferes with the operation of the academic process.
15. Facilitating or aiding in any act of academic dishonesty.

I have read the above policy and understand each act of dishonesty as described. I have had the opportunity to ask my instructor questions to clarify any parts I do not understand.

______________________ _______________ _____________________ _____________
Printed Last Name, First Name ID# Signature Date