

## CS/CE 6352.001 Performance of Computer Systems and Networks

Semester Spring 2007

Classes Tuesdays and Thursdays 4:00 - 5:15 PM in ECSS 2.201

Instructor G. R. Dattatreya

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Course website: <http://www.utdallas.edu/~datta/CS6352/sp07>

Office: ECS (South) 4.208

Hours: 2:45 - 3:45 PM, Tuesdays and Thursdays.

Additional hours by appointment

Phone: 972-883-2189

TA Name: TBA (possibly, Ajay Kulkarni)

Prerequisite A first course on Probability Theory and Mathematical Statistics.

Students are expected to have a good understanding of the prerequisite material. Mere familiarity with the subject is not sufficient. In particular, concepts and details from the following topics will be routinely used. Sample space, Event space, Algebra of Events, Axioms of probability, Evaluation of probabilities of complex events, Conditional probability and statistical independence. The concept of a random variable, simple discrete and continuous random variables, probability distribution, mass, and density functions. Conditional distribution, mass, and density functions and statistically independent random variables. Expectation and conditional expectation.

Text Book None essential

Course material Electronic notes in the form of a book will be provided.

Objectives To learn (1) queuing theoretic models and analysis techniques of computer and communication network systems' performance, (2) to apply the principles to some practical cases.

Evaluation Midterm 1: 20%; Thursday Feb. 8, 2007; 4:00 - 5:15 PM; class room  
Midterm 2: 20%; Thursday Mar. 22, 2007; 4:00 - 5:15 PM, class room  
Final exam: 20%; **Thursday Apr. 26, 2007; 2:00 - 4:00 PM** (per university Final Exam schedule), class room. Final Exam is not comprehensive.  
Project/s: Phase 1: 10%, due at 5:00 PM on Friday Mar. 2, 2007  
Project Phase 2: 10%, due at 5:00 PM on Friday Apr. 20, 2007  
Homework: 15%  
Attendance and class participation: 5%

## Brief description of topics

Quick review of probability theory: Physical origin of Poisson and Exponential random variables; their properties.

Steady state M/M/1/ $\infty$  queuing system analysis. Performance measures and Little's result. Laplace transform and its use in functions of random variables.

Various special cases of the state dependent, continuous time, single Markovian queue. Applications.

Steady state M/G/1/ $\infty$  queuing system: Derivation of Pollaczec-Khinchin mean value formula. Application examples.

Discrete time queuing systems. Application examples.

Open Markovian queuing networks. Product form solution. Performance measures.

Closed queuing networks. Product form solution. Convolution algorithms to solve for product-form state probabilities. Performance measures.

Mean value analysis solution to closed queuing systems. Performance measures.

### **Additional information and policies**

Students will learn better and more by being well prepared to follow and understand the required material on a weekly basis. This is not a subject that can be understood and applied by spending infrequent bursts of times before examinations. Therefore attending **most of the classes** is mandatory.

Students are responsible for keeping up with homework and project submission dates and times. You do not have to word process your homework. But your brief project reports should be computer generated.

Homework and projects, and examinations should be products of individual efforts. If group projects are assigned, corresponding policy will be discussed in class. Homework and projects are required to be submitted on due dates at or before the beginning of the corresponding classes. Academic dishonesty and such attempts will be viewed very seriously and appropriate action will follow. It is the responsibility of students to know the UTD policies on academic dishonesty.

### **Grading**

Please pay attention to the following. A minimum of 50% is expected in each midterm, AND in the final, AND in EACH project, AND in all the Homework put together, to pass the course (letter grade "C" or better). For midterms and Final, partial credit for wrong and incomplete answers will depend on how much of the main ideas required to solve the problems are clearly shown. Homework evaluation will be cursory, based on the apparent effort put in towards correct answers. If approaches are correct by and large, you will receive full credit for homework. Assignment of final letter grades is relative to the class average (of all the students scoring 50% or above in each category).