

**King Fahd University of Petroleum & Minerals**  
**College of Computer Sciences and Engineering**  
**Computer Engineering Department**  
**CSE 642 Computer Systems Performance (3-0-3)**  
**Fall 2004 (Term 041)**  
**Syllabus**

### **Course Objectives**

At the end of the course, the student should be able to create appropriate models of computer systems and computer networks. The student should also be able to utilize analytical techniques for evaluating these models where applicable. Emphasis is placed on modeling and evaluation of computer networks and multiple-access methods.

### **Catalogue Description**

Queueing theory. Stochastic Petri nets and Markov Chains. Separable queueing networks. Priority queueing systems. Evaluation studies: monitoring techniques, modeling methods and model validation. Application of queueing theory to computer time-sharing and multi-access systems, multiprocessor systems, interconnected networks. Computer communication networks. Case studies of several distributed system configurations.

**Prerequisite:** COE 532, SE 541, or consent of the instructor.

**Instructor:** Dr. Ashraf S. Hasan Mahmoud.

**Office:** 22-148-3    **Phone:** 1724    **Email:** [ashraf@ccse.kfupm.edu.sa](mailto:ashraf@ccse.kfupm.edu.sa)

**Class**

**Hours/Place:** UT 8:00-9:15 pm – Room 22-119

**Office hours:** Sundays and Tuesdays 12:00 – 1:00 and 3:30 – 4:45 pm, and by appointment.

**Course URL:** [http://www.ccse.kfupm.edu.sa/~ashraf/CSE041\\_642/CSE041\\_642.htm](http://www.ccse.kfupm.edu.sa/~ashraf/CSE041_642/CSE041_642.htm)

**Textbook:** Jeremiah F. Hays, and Thimma V. J. Ganesh Babu, Modeling and Analysis of Telecommunications Networks, John Wiley, 2004

**References:** P. King, Computer and Communication Systems Performance Modelling, Prentice Hall, 1990

Jeremiah F. Hays, Modeling and Analysis of Computer Communications Networks, Plenum Press, New York, 1984

L. Kleinrock, Queueing Systems, Volume I, New York , John Wiley and Sons, 1975

### **Grading Policy (Tentative):**

Class Homework/Quizzes/Participation	15%	
Major Exam	15%	
Project	40%	
Final Exam	30%	Scheduled by the registrar

### **TENTATIVE Course Plan**

(In addition to the material below, problem statement for the course project, detailing its requirement and background material, in addition to presentations are expected to require 4 lectures. Those lectures will be interlaced with the material below).

#### **1. Introduction to Performance Evaluation in Telecommunications**

Introduction to switching technologies, functional organization of network protocols, etc.

#### **2. Overview of Probability Theory and Markov Chains**

Overview of probability theory and random variables distributions. Single and multiple random variable characterization. Markov chains and state transition matrix. Random processes.

#### **3. Queueing Models**

Little's formula. Poisson counting process. Birth and death processes and applications to queueing theory: M/M/1 queue and its variations

#### **4. Network of Queues**

Jackson Networks. Burke's Theorem

#### **5. Analysis to Multiplexing and Access**

Analysis of TDM, statistical TDM, asynchronous TDM, and random access techniques.

#### **6. Imbedded Markov Chains**

M/G/1 queue and its variations. Priority queues. Busy period analysis. G/M/1 queues. Analysis of polling networks.