Bangladesh Army University of Science and Technology
Department of Computer Science & Engineering

Course Outline

Course Title: **Mathematical Analysis for Computer Science** Credit: **3.00**
Course Code: CSE 3207

Course Teacher:
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Course Description:

Recurrent problems; Manipulation of sums; Number theory; Special numbers; generating functions;
Probability Distributions and Expectations: total probability and Bayes' rule, discrete probability distributions, continuous probability distributions; Random variables; stochastic process; Markov chains (discrete parameter, continuous parameter, birth-death process); Queuing models (birth-death model, Markovian model), open and closed queuing network; Application of queuing models.

Reference Book(s):

1. Concrete Mathematics - Knuth.
2. Queueing Systems. Volume 1: Theory, Leonard Kleinrock
3. Performance Modeling and Design of Computer Systems- Queueing Theory in Action, Mor Harchol-Balter, Cambridge University Press, 2013
4. Introduction to Probability Models- Sheldon M. Ross.

Course Objectives:

By the end of this course, students will be able to:

Marks Distribution:

Theory Course	
Class Participation / Observation	5%
Class Attendance	5%
HW/ Assignment/ Quizzes/**Class tests**	20%
Final Examination (3 hours)	70%
Total	**100%**

MATHEMATICAL ANALYSIS FOR COMPUTER SCIENCE

Weeks	Lecture	Topics Covered	Remarks
1	L-1	Introduction, Review of probability	
	L-2	Bayes' rule , Random variable, Expectation of RV	
	L-3	Discrete probability distribution	
2	L-4	Continues probability distribution	
	L-5	Poisson process and Exponential distribution	
	L-6	Stochastic process , Markov Process and Markov Chain	
3	L-7	Discrete-time Markov chains	
	L-8	Discrete-time Markov chains	
	L-9	Discrete-time Markov chains	
	CLASS TEST 1		
4	L-10	Continuous-time Markov chain	
	L-11	Continuous-time Markov chain	
	L-12	Continuous-time Markov chain	
5	L-13	Birth-Death Process	
	L-14	Introduction to queueing theory and its applications.	
	L-15	Analysis of the M/M/1 (Single Server Case) ***q***ueueing System	
6	L-16	Problem Solving of M/M/1 ***q***ueueing System	
	L-17	Analysis of the M/M/m (The m-Server Case) queueing System.	
	L-18	Analysis of the *M/M/m/m* Systems	
	CLASS TEST 2		
7	L-19	Analysis of the *M/G/1* Queue	
	L-20	Queueing Networks - Classification and Basic Concepts	
	L-21	Open and Closed Jackson Networks	
	MID BREAK		
8	L-22	Introduction	
	L-23	Recurrent Problems	
	L-24	Recurrent Problems	
9	L-25	Recurrent Problems	
	L-26	Sums	
	L-27	Sums	
	CLASS TEST 3		
10	L-28	Integer Functions	
	L-29	Integer Functions	
	L-30	Number Theory	
11	L-31	Number Theory	
	L-32	Number Theory	
	L-33	Number Theory	
12	L-34	Binomial Coefficients	
	L-35	Binomial Coefficients	
	L-36	Special Numbers	
	CLASS TEST 4		
13	L-37	Special Numbers	
	L-38	Generating Functions	
	L-39	Generating Functions	
14	L-40	Review Class-1	
	L-41	Review Class-2	
	L-42	Review Class-3	

Special Instructions:

1. Students are encouraged to attend classes on time. Latecomers will not be allowed to disrupt the flow of the lecture.
2. After each class, students should review class notes seriously because usually the next topic relies on the previous topic.
3. No makeup class test.