CS/SE 3341 *Probability and Statistics in Computer Science*

Spring 2006

Time: TuTh 11^{00} am – 12^{15} pm
Room: ECSS 2.410

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Internet : **http://www.utdallas.edu/~mbaron/3341/Spring06/**
This site will contain *homework assignments*, some *lecture notes*, solutions to *quizzes* and *exams* (after you submit them!), hints and answers to homework problems, and other info.

Also, see **http://webct.utdallas.edu/** to check your *performance* and enjoy *discussion*, *mail*, and *chat* with your classmates. Use your Unix password to log in.

Textbook : Probability and Statistics with Reliability, Queuing, and Computer Science Applications, by K. Trivedi, John Wiley and Sons, New York, second edition

Grading:

Best 9 of 10 ten-minute quizzes	=	30%
A $1\frac{1}{4}$-hour Midterm exam	=	30%
A $2\frac{1}{2}$-hour Final exam	=	40%

$97-100$	%	=	$A+$	$93\frac{1}{3}-97$	%	=	A	$90-93\frac{1}{3}$	%	=	$A-$
$86\frac{2}{3}-90$	%	=	$B+$	$83\frac{1}{3}-86\frac{2}{3}$	%	=	B	$80-83\frac{1}{3}$	%	=	$B-$
$76\frac{2}{3}-80$	%	=	$C+$	$73\frac{1}{3}-76\frac{2}{3}$	%	=	C	$70-73\frac{1}{3}$	%	=	$C-$
$66\frac{2}{3}-70$	%	=	$D+$	$60-66\frac{2}{3}$	%	=	D	$55-60$	%	=	$D-$

Incomplete grade is possible only in the case of a documented serious medical emergency near the end of semester, with $\geq 70\%$ of work completed at an on-going passing grade.

Rules : All quizzes and exams are open-book and open-notes.

Your solutions, not your answers, are graded. Show your work. No work - no credit.

No late exams or quizzes. However, it may be possible to take an exam/quiz early.

Homework will be assigned but will not be collected or graded.

Tips : A steady effort to work out all the assigned problems is highly recommended.

Use your absolute right to ask questions in class and during instructor's and TA's office hours. For example, any homework problem can be discussed.

For each exam/quiz, review all the new concepts, methods, formulae, etc. Try to understand the methods rather than to memorize them.

For efficient use of the exam time, prepare a brief summary of important formulae and methods you may need for the exam. Arrange it on a single sheet of paper in the most convenient way.

SCHEDULE

This schedule may change slightly during the semester. However, the quiz/exam dates are firm.

DATE	TOPICS	CHAPTERS
Jan 10 - 12	Introduction. Events and outcomes. Probability rules.	1
Jan 17 - 19	Conditional probability. Independence. Bayes' Rule. Combinatorics.	1
Jan 24 - 26	Random variables and their distributions. Discrete random variables.	2
Jan 31 - - Feb 2	Discrete distributions: Bernoulli, Binomial, Geometric, Negative Binomial, Poisson.	2
Feb 7 - 14	Continuous distributions and probability densities. Continuous distributions: Exponential, Gamma, Weibull, Hyperexponential, Normal	3
Feb 16 - 21	Expectation and moments.	4
Feb 23	Central Limit Theorem.	4.7
Feb 28	*Review*	
March 2	**MIDTERM EXAM**	1–4
March 14	Simulation of discrete and continuous random variables. Solving problems by Monte Carlo methods.	*Lecture notes*
March 16	Stochastic processes. Main concepts and classification.	6.1-6.2
March 21-23	Bernoulli process. Poisson process.	6.3-6.4
March 28-30	Markov chains and simple queuing systems.	7, 9
Apr 4	Simulation, performance evaluation.	
Apr 6-11	Statistical inference. Parameters and statistics. Parameter estimation and hypothesis testing.	10
Apr 13-18	Linear regression. Method of least squares. Analysis of variance.	11
Apr 20	*Review.*	
Apr 25	**FINAL EXAM at 11:00 am**	6-11 (1-11)

Quizzes:

Day	Sections	Day	Sections	Day	Sections
Jan 20	1.1-1.7	Feb 10	2.5	Mar 24	6.1-6.2, notes
	pp.26-27	Feb 17	3.1-3.3	Mar 31	6.3-6.4
Jan 27	1.8-1.11	Feb 24	3.4	Apr 7	7.1-7.3, 9.1-9.2
Feb 3	2.1 - 2.4			Apr 14	10.1-10.2

CALCULUS AND ALGEBRA PROFICIENCY REQUIRED FOR THIS COURSE

Concepts and skills	When needed	Examples
Factorial(*)	sect. 1.8, 2.5	compute 5!, simplify and compute 35!/33!
Sigma-notation	sect. 1.7	compute $\sum_{k=1}^{10} k^2$
Geometric series	sect. 2.5	compute $\sum_{j=3}^{\infty} 3(0.2)^j$, $\sum_{j=3}^{\infty} j(0.2)^j$
Derivatives and integrals	Ch. 3,4	$\frac{d}{dx}(1-e^{-3x})$, $\frac{d}{dx}\int_0^x e^{t^2/2}dt$
Integration of polynomial and exponential functions	Ch. 3,4	find $\int_0^b (x^2+2^x)dx$; compute the area under the graph of x^2 between $x=-1$ and $x=2$
Integration by substitution	Ch. 3,4	$\int_0^1 e^{5x}dx$, $\int x^2 e^{5x^3}dx$
Integration by parts	Ch. 3,4	$\int x^2 e^x dx$
Gamma function and related integrals(*)	sect. 3.4	compute $\Gamma(4)$, $\int_0^\infty x^8 e^{x/5}dx$, simplify $\Gamma(n+k)/\Gamma(n)$ for $k, n > 0$
Inverse functions	3.5, Monte Carlo	If $f(x) = 2p^x$, find $f^{-1}(y)$
Matrices(*)	Ch. 7	Let $A = \begin{pmatrix} 0 & .75 & .25 \\ .9 & 0 & .1 \\ .8 & .2 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} .7 & .2 & .1 \\ .3 & .4 & .3 \\ .1 & .3 & .6 \end{pmatrix}$.