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

Summer 2005

Time: TuTh 6^{00} pm – 7^{50} pm
Room: ECSS 2.415

Instructor:	Dr. Michael Baron	*Assistant:*
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Office hours:		

Internet : **http://www.utdallas.edu/~mbaron/3341/Summer05/**
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:

Ten-minute quizzes (lowest dropped)	=	30%
A $1\frac{3}{4}$-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.

Be sure to have the required calculus skills for each exam and quiz.

SCHEDULE

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

DATE	TOPICS	CHAPTERS
May 17 - 24	Introduction. Events and outcomes. Probability rules. Conditional probability. Independence. Bayes' Rule. Combinatorics.	1 1
May 26 - 31	Random variables and their distributions. Discrete random variables.	2
May 31 - June 2	Discrete distributions: Bernoulli, Binomial, Geometric, Negative Binomial, Poisson.	2
June 7 - 9	Continuous distributions and probability densities. Continuous distributions: Exponential, Gamma, Weibull, Hyperexponential, Normal	3
June 14 June 16	Expectation and moments. Central Limit Theorem.	4 4.7
June 21 **June 23**	*Review* **MIDTERM EXAM**	 1–4
June 28 June 30	Stochastic processes. Main concepts and classification. Bernoulli process. Poisson process.	6.1-6.2 6.3-6.4
July 5-7	Markov chains and simple queuing systems.	7, 9
July 12-14	Statistical inference. Parameters and statistics. Confidence estimation and hypothesis testing.	10
July 19	Linear regression. Method of least squares.	11
July 21 **July 28**	*Review.* **FINAL EXAM at 6:00 am**	 6-11 (1-11)

Quizzes:

Day	Sections	Day	Sections	Day	Sections
May 26	1.1-1.7	June 9	2.1-2.5	July 7	6.1-6.4
	pp.26-27	June 16	3.1-3.4	July 14	7.1-7.3, 7.7
June 2	1.8-1.11	June 30	4.2, 4.7		

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 $B = \begin{pmatrix} .7 & .2 & .1 \\ .3 & .4 & .3 \\ .1 & .3 & .6 \end{pmatrix}$. compute $A+B$, $A-B$, AB, A^3.
Limit	sect. 3.1, 4.7	compute $\lim_{x\to\infty} \frac{\sin(\pi x)}{x}$, $\lim_{x\to 0} \frac{\sin(\pi x)}{x}$

(*) This material will be presented and discussed in class.