

STATISTICS 230

Fall Term, 1989

This course is intended to introduce students to *probability* and its applications. Probability is the basis of stochastic *modelling* in statistics, and in a number of other areas such as actuarial science, computer science, operations research, theoretical physics and the biological sciences. Checking the *adequacy* of a mathematical model requires that suitable *data* be available.

TEXT: Strongly recommended – Kalbfleisch, J.G. *Probability and Statistical Inference. Volume 1. Probability.* Second Edition, Springer-Verlag, 1985.

TOPICS: *Introduction:* Probability models, combinatorial probability.
The Calculus of Probability: Union, intersection, probabilistic independence, conditional probability.
Discrete Random Variables: Hypergeometric, binomial, Poisson and negative binomial distributions; approximations; multinomial distribution.
Continuous Random Variables: Histograms; uniform, exponential and normal distributions; joint distributions.
Expectation: Definitions; mean and variance; linear combinations; covariance.
Normal Approximations: Central limit theorem; continuity correction. (*More details are given overleaf*)

INSTRUCTOR: W.H. Cherry, Department of Statistics & Actuarial Science, office MC 6153, telephone 888-4482.

OFFICE HOURS: Tuesday, 4.30 to 5.20 p.m.; Wednesday, 3.30 to 4.30 p.m.; other times by appointment (if *really* necessary). Students must make proper use of the scheduled tutorials and the tutors' office hours for assistance with assignment questions – see the details overleaf.

ASSIGNMENTS: There are ten (10) assignment sheets for the course; they contain from 8 to 27 questions each. These questions are classified as follows: type **A** ("assigned"), five or six in number, which *every* student should do on a weekly basis; type **S** ("supplementary"), which provide further practice, for those who wish to make use of it, of basically the same ideas as the assigned questions; type **B** ("bonus"), for students who have time and inclination to tackle a few more challenging questions. Answers to questions indicated by ☞ are to be submitted for grading at the Friday class of the appropriate week; answers will be assessed on a 3-point scale (*e.g.*, 0 or 1: unsatisfactory; 2: marginal; 3: satisfactory). Students are encouraged to work cooperatively together on assignments, but answers *must* be written up independently; copying assignment answers is a serious academic offence.

Assistance with assignment questions will be available at tutorials (for shorter questions) and from your tutor during posted office hours (for longer enquiries). Some answers of the assignment questions will be posted in the Tutorial Centre (MC 3004) *for a period of two weeks from the due date*; some assignment questions may be discussed in tutorials.

TUTORIALS: The tutorials are intended to improve students' problem-solving ability. At the start of each tutorial period, you will be given some questions to work on; later in the period, your tutor, with class assistance, will work towards answers to these questions.

MIDTERM: There will be one midterm test in the course, held in the second-year testing time slot from 5 to 7 p.m. on Thursday, November 2, 1989, at locations that will be announced in class (likely in the October 23 lecture). The midterm covers the course material up to the end of Chapter 4 of the text; *i.e.*, up to the end of Assignment 6. The only permitted aid for the midterm is a calculator.

ASSESSMENT: Each student's final mark in the course will normally be calculated according to the <i>better</i> of the two schemes shown at the right:	Assignments	10%	or	5%
	Midterm	20		10
	Final examination	70		85
However, an examination mark of under 40% normally results in failure in the course <i>regardless of term work.</i>	Total	100%		100%

EXAMINATION: The final examination is of 3 hours' duration and is held in the regular examination period; it covers *all* the course material. Some of the examination questions will be variations on assignment questions. The *only* permitted aid is a calculator; but attached to the examination paper will be a copy of the normal table (see pp 330-331 of the text) and a formula sheet (made available to students at the end of lectures).

OUTLINE SCHEDULE: Lecture times are 10.30 a.m. on Monday, Wednesday and Friday, and the tutorials are at 4.30 p.m. on Monday (Section 05), 3.30 p.m. on Tuesday (Section 06), and 4.30 p.m. on Wednesday (Sections 07 and 08). Term begins on Monday, September 11, 1989 and ends on Monday, December 4, 1989. There is a University holiday on Monday, October 9; both the Monday lec-

ture *and* the Monday weekly tutorial are lost in this week. A tentative schedule of course activities is given in the following table, although your instructor may vary this schedule to suit the needs of your particular lecture Section(s).

WEEK STARTING	TOPICS COVERED	TEXT SECTIONS	ASSIGNMENT DUE
September 11	Introduction, sample space, combinatorial probability	1.3,2.2,2.4	---
18	Binomial theorem, hypergeometric identity, rules of probability, mutually exclusive and independent events	2.1,1.3,3.1, 3.2,3.3	1
25	Conditional probability, probability models, random variables	3.4,3.5,3.6,4.1,4.3	2
October 2	Discrete model distributions: uniform, hypergeometric, binomial, negative binomial, geometric, Poisson	4.1,2.3,2.5, 4.2,4.4	3
9	Poisson approximation to binomial, multivariate discrete distributions	4.3,4.5,4.6	4
16	Multivariate discrete distributions, multinomial distribution	4.5,4.6,4.7	5
23	Expectation, mean, variance	5.1,5.2,5.3	6
30	Variance, covariance	5.2,5.3,5.4	Midterm
November 6	Covariance, mean and variance of linear combinations, indicator variables	5.4,5.5,5.6	7
13	Continuous random variables, change of variable, expectation, continuous uniform and exponential distributions	6.1,6.2,6.5	8
20	Normal distribution, central limit theorem, normal approximations, continuity corrections	6.6,6.7,6.8	9
27	Completion of the above material, review	---	10
December 4	Review	---	---

Tutors: J.A.: Jim Adams MC 6099 ext. 6681
 T.M.: Takis Merkouris MC 6231 ext. 6720
 C.K.: Carl Kaufmann MC 6208 ext. 6701
 J.E.: John El-Haddad MC 6116 ext. 6712

Section	Day	Type	Tutor(s)	Place	Time
C05	Monday	Tutorial	J.A., T.M.	MC 4058	4.30-5.20 p.m.
	Tuesday	Office hours	J.A.	MC 6099	12.00-1.00 p.m.
	Thursday	Office hours	T.M.	MC 6231	2.00-3.00 p.m.
C06	Tuesday	Tutorial	C.K., J.E.	MC 2034	3.30-4.20 p.m.
	Wednesday	Office hours	C.K.	MC 6208	2.00-3.00 p.m.
	Thursday	Office hours	J.E.	MC 6116	2.00-3.00 p.m.
C07	Tuesday	Office hours	J.E.	MC 6116	2.00-3.00 p.m.
	Wednesday	Tutorial	C.K., J.E.	MC 4040	4.30-5.20 p.m.
	Thursday	Office hours	C.K.	MC 6208	3.00-4.00 p.m.
C08	Tuesday	Office hours	T.M.	MC 6231	2.00-3.00 p.m.
	Wednesday	Tutorial	J.A., T.M.	MC 2035	4.30-5.20 p.m.
	Thursday	Office hours	J.A.	MC 6099	12.00-1.00 p.m.

ASSIGNMENTS

How to Help the Marker (and Yourself)

- Don't put assignments in binders, envelopes, slip cases, etc.
- Staple upper left-hand corner – *no* paper clips.
- Print course name, number and instructor's name in centre of first page.
- *Print* name, I.D. and section number in upper right-hand corner of each page.
- Have questions labelled and in order.
- Have question *parts* labelled, distinctly separated, and in order.
- Use legible writing and a neat appearance.