



STAT 273

Risk and Chance



STAT 273

Risk and Chance

Semester 1

2005

*Students in this unit should read this unit outline carefully at the start of semester. It contains important information about the unit. You should also refer to the Stat273 web page at <http://www.stat.mq.edu.au/units/>.*

Stat273/info05a

Student Resource Centre  
Division of Student Services  
MACQUARIE UNIVERSITY

## About Stat273

Stat273 is a 3 credit point unit run by the Statistics Department in the Division of Economic and Financial Studies.

This unit is designed for students majoring in Statistics and/or any discipline other than Actuarial Studies. The teaching will focus on the understanding of probability concepts and their applications. EXCEL and *Scientific Notebook* will be used to assist in calculation and simulation.

**Prerequisites:** The minimum prerequisites for this unit are: Stat170(P); Stat172(P) or Stat175(P) or GPA>1.5.

Basic skills of calculus, such as elementary differentiation and integration, are essential for this course. However, the emphasis will be on the understanding of the processes, rather than the actual calculations.

## Lecturer:

Hilary Green  
Room: C5C482  
phone: 9850 8562            fax: 9850 7669  
[hgreen@efs.mq.edu.au](mailto:hgreen@efs.mq.edu.au)

## Classes

### Lectures:

Wednesday: 6 – 8pm, E6A 102

### Tutorials:

Tutorial participation is a **compulsory** component of this course. Tutorials will be held on Wednesdays at 4pm, 5pm and 8pm. All tutorials will be held in C5C 217. Tutorials start in the **second** week of the semester.

## Texts:

**Required:** **STAT273 Course Notes – 2004**, from the Co-op Bookshop.

### References that may be useful:

Kinney, J.J. (1997) *Probability - An Introduction with Statistical Applications*, John Wiley and Sons QA273.K493/1997

Scheaffer R.L. (1994) *Introduction to Probability and Its Applications*, (2<sup>nd</sup> Edition) Duxbury Press, QA273.S357

Wackerly, D., Mendenhall W. Scheaffer. *Mathematical Statistics with Applications* (4<sup>th</sup>, 5<sup>th</sup> or 6<sup>th</sup> Editions) QA276 .M426 2002

Sincich, T., Levine, D.M., Stephan, D. (1999) *Practical statistics by example using Microsoft Excel* QA276.12 .S554

Copies these books are held in the Reserve section of the library.

Students will also be directed to relevant websites each week.

## **Websites:**

1. Stat273 homepage: <http://www.stat.mq.edu.au/units/stat273/>  
(for general information, homework, assignments and solutions)
2. Online Discussions and Review Quizzes and solutions:  
[http://online.mq.edu.au/SCRIPT/STAT273/scripts/serve\\_home/](http://online.mq.edu.au/SCRIPT/STAT273/scripts/serve_home/)

## **Learning Outcomes:**

### **Probability theory**

By the end of this unit, students should;

- Have a solid understanding of introductory probability theory,
- Understand the difference between discrete and continuous random variables
- Understand the difference between theoretical and empirical probability,
- For various discrete and continuous random variables,
  - Be familiar with the distributions
  - Write the function and the cumulative distribution functions.
  - Graph the distribution and the cumulative distribution function
  - Calculate probabilities, expected values, variances and standard deviations
  - Generate Distributions
  - Generate random numbers from Distributions
  - Solve probability problems
- For bivariate probability distributions (discrete and continuous), find
  - Joint, marginal and conditional probabilities,
  - covariance
- Understand basic anatomy of homogeneous Markov Chains and
  - Find stationary distribution, if one exists,
  - Manipulate and interpret Markov Chains with absorbing states.

### **Generic Skills**

By the end of this unit, students should;

- Have enhanced their problem solving ability,
- Have improved their report writing and written communication skills
- Have acquired useful Internet skills

### **Statistical computing**

By the end of this unit, students should;

- Be able to generate probability distributions and cumulative distributions, and graph these distributions
- Be able to simulate random numbers from probability distributions and cumulative distributions,
- Be able to organise and summarize random data,
- Determine whether random data fits a particular model
- Be able to find probabilities, expected values etc, using an appropriate statistical package

## **Teaching and Learning Strategy:**

### **Lectures**

Lectures begin in Week 1. Students should attend ONE 2-hour session per week. The Study Guides package should be brought to lectures each week as it contains copies of the lecture slides.

### **Tutorials**

Tutorials begin in Week 2 and are based on work from the previous week's lecture. The aim of tutorials is to apply techniques learnt in lectures to solving problems using a statistical package.

Students are required to attend one tutorial a week. Practical exercises and worksheets will be handed out at each tutorial and sometimes a word processed report will be required. All tutorial work will be assessed either by your tutor or online or both.

### **Additional Exercises**

A number of exercises appear at the end of each lecture in the Study Guide. It is expected that students will attempt all the questions. The exercises will not be discussed during the tutorial, although some may be discussed during the lectures. A solution will be made available on the website.

Students should also investigate the websites recommended in the lectures each week.

### **Online Quizzes**

These provide you with an opportunity to gauge your basic understanding of the concepts introduced in the course. They contribute 9% towards the total assessment.

Your login ID is "gffffnnn", where "g" is the first letter of your given name, "ffff" is the first four letters of your family name (or as many as possible if less than four) and "nnn" are three digits. Your initial password "abnnnnnn" where "ab" will be two random characters and "nnnnnn" your date of birth. You will have been mailed your username and the two random characters after enrolling.

## **Assessment:**

The unit will be assessed as follows:

- Two Mid-semester Tests 12% (6% each)
- Two Assignments: 8% (4% each)
- Online Quizzes 10%
- Tutorial work 10%
- Final Exam 60%

A satisfactory performance is required in all aspects of the unit. **To pass the unit you must pass the final examination.** Your final grade will reflect your performance in **all** aspects of the course. In order to attain a particular grade in the unit, the requirement for that grade must be met in **the exam and the coursework**. You should also refer to the University's rules on grades, rule 10(2), <http://handbook.mq.edu.au/PDFs/ug-bachelor-degree-rules.pdf> .

### **Assignments:**

There will be two compulsory assignments. They are to be posted to the appropriate assignment box in ERIC, C5C244, by **6 pm** of the due date. Late submission of assignments will be penalized at the rate of 20% per day. Failure to submit assignments may result in automatic exclusion from the unit. The due dates are:

Assignment 1 Due: Wednesday, 13<sup>th</sup> April (week 7)

Assignment 2 Due: Wednesday, 1<sup>st</sup> June (week 12)

The assignment will not be marked unless it is accompanied by the appropriate assignment cover sheet.

### **Plagiarism**

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found on the web at: <http://www.student.mq.edu.au/plagiarism/>. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

### **Mid-semester Tests:**

Two mid-semester tests of 50 minutes will be held in the first lecture hour. The tests will be on:

Week 6, 6<sup>th</sup> April

Week 10, 18<sup>th</sup> May

Any student who cannot attend the test due to unavoidable disruption must report the circumstances (supported by medical certificate or other proper evidence) in writing to the Registrar as soon as possible.

### **Final Examination**

This will be of 3 hours duration with 10 minutes reading time.

For both of the Mid-semester tests and Final examinations you are allowed to bring in one A4 page of handwritten notes, written on both sides. All necessary statistical tables will be provided.

An electronic calculator is essential and will be required for the final examination and class tests. Text-returnable calculators are not permitted in the tests or exam.

### **Students with Disabilities**

Students with disabilities are encouraged to contact the Equity Support Unit to determine whether they are eligible for support service. The Equity Support Staff can be contacted on 9850 7497. The web page is <http://www.mq.edu.au/uhs/equity.html>. The Advice of Disability form may be downloaded from <http://www.sss.mq.edu.au/equity/policies/>

### **Misadventure**

Should you suffer illness or other misadventure which affects your performance during term or for the exam, then you should fill in an Advice of Absence or other Circumstances and /or Request for Special Consideration.

Students should read the DEFS' information regarding supplementary exams, [http://www.efs.mq.edu.au/services/policies\\_consideration.htm](http://www.efs.mq.edu.au/services/policies_consideration.htm)

## STAT273 Risk and Chance

### UNIT SCHEDULE Semester 1, 2005

WEEK	LECTURE TOPIC	To Do
28 February W1	Experiments, sample spaces, Probability Rules, Permutations and Combinations Theoretical vs. Empirical probability	Obtain Course Notes from Bookshop. Quiz 1, Practice Ex 1
7 March W2	Conditional Probability Independence, Bayes' Theorem	Quiz 2, Prac Quiz 2, Practice Ex 2
14 March W3	Random Variables Probability Functions, Discrete Probability Distributions, Cumulative Distribution functions, Expected value and Variance	Quiz 3, Prac Quiz 3, Practice Ex 3
21 March W4	Discrete Distributions; Bernoulli, Binomial, Geometric and Poisson.	Quiz 4, Prac Quiz 4, Practice Ex 4
28 March W5	More Discrete Distributions; Negative Binomial and Hypergeometric.	Quiz 5, Tutorial 5, Practice Ex 5
4 April W6	Introduction to Markov Chains States, Transition probabilities, State vectors, Equilibrium, Absorbing States	Quiz 6, Tutorial 6, Practice Ex 12 <b>Test 1</b>
11 April W7	Introduction to Continuous random variables	Quiz 7, Tutorial 7, Practice Ex 6 <b>Assignment 1 due</b>
<b>Midsemester Break: 16<sup>th</sup> April – 2<sup>nd</sup> May</b>		
2 May	Cumulative distribution function Functions of Random Variables, Sampling distributions, Uniform and Exponential Distributions.	Quiz 8, Tutorial 8, Practice Ex 7
9 May W9	Normal Distribution Model checking, Central Limit Theorem, Normal Approximations	Tutorial 9, Practice Ex 8
16 May W10	Gamma Distributions, Beta Distribution Tchebysheff's Theorem	Quiz 10, Tutorial 10, Practice Ex 9 <b>Test 2</b>
23 May W11	Chi-squared Distribution, Distribution of sample variance, F-Distribution, Test for Equality of Variance, t- Distribution, Distribution of sample mean ( $\sigma$ unknown)	Quiz 11, Tutorial 11, Practice Ex 10
30 May W12	Joint Distributions: Discrete and Continuous cases	Quiz 12, Tutorial 12, Practice Ex 11 <b>Assignment 2 due</b>
6 June W13	Review	Review Quiz, Tutorial 13