



Division of Economic and Financial Studies

STAT 273/STAE273

Introduction to Probability

First Semester 2008 – I1

Unit Outline

Unit Convener: Hilary Green

*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/ug/units/stae\\_units/stat273](http://www.stat.mq.edu.au/ug/units/stae_units/stat273)*

## 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 calculations and simulation.

**Prerequisites:** The minimum prerequisites for this unit are:  
Stat170(P); Math 123(P) or equivalent; 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: E4A 531

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:

Tutorials start in the **second** week of the semester. Tutorial participation is a **compulsory** component of this course.

Wednesday: 5pm E4B 102

Wednesday: 8pm E4B 111

## Materials

Lecture notes will be available from WebCT the night before the lecture. Students should read the lecture notes before the lecture. The assignment and lecture notes pages are password-protected. The userid and password will be provided at the first lecture.

### **References that may be useful:**

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

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

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

Copies of 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/ug/units/stat\\_units200/stat273](http://www.stat.mq.edu.au/ug/units/stat_units200/stat273) or [http://www.stat.mq.edu.au/ug/units/stae\\_units/stae273](http://www.stat.mq.edu.au/ug/units/stae_units/stae273)  
(for general information, lecture notes, homework, assignments and solutions)
2. Online Discussions, Review Quizzes and solutions:  
<https://learn.mq.edu.au/webct>

## Learning Outcomes

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,
  - o Be familiar with the distributions
  - o Write the function and the cumulative distribution functions.
  - o Graph the distribution and the cumulative distribution function
  - o Calculate probabilities, expected values, variances and standard deviations
  - o Generate Distributions
  - o Generate random numbers from Distributions
  - o Solve probability problems
- For bivariate probability distributions (discrete and continuous), find
  - o Joint, marginal and conditional probabilities,
  - o covariance
- Understand basic anatomy of homogeneous Markov Chains and
  - o Find stationary distribution, if one exists,
  - o 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
- 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.

## The Ho Kam-chiu Prize in Statistics

The prize is open to all students taking at least 9 credit points in 200-level and/or 300-level Statistics units in one academic year. The prize will be awarded to the student in this category with the highest average SNG in all Statistics units taken at 200 and 300 level in the particular year. A student may be awarded the prize more than once if he/she continues to be the best student in successive years of study.

## Teaching and Learning Strategy

### Lectures

Lectures begin in Week 1. Students should attend ONE 2-hour session per week. The lecture notes must be bought to the lecture each week. These will be available from the unit web page the night before the lecture.

### Tutorials

Tutorials are compulsory and attendance will be monitored. 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 solve problems using a statistical package.

Students are required to attend ONE 1-hour 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.

*Failure to attend tutorials and complete the exercises may result in exclusion from the unit.*

### Additional Exercises

Additional exercises will also be made available on the web. 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 practice and gauge your basic understanding of the concepts introduced in the course. They contribute 12% towards the total assessment.

Your login ID is 8-digit Student ID Number found on your Campus Card. Your password will be the same password used to access myMQ Student Portal (<https://my.mq.edu.au>).

Further information about WebCT and IT support arrangements is available at: <https://learn.mq.edu.au/webct>

### **Assessment:**

The unit will be assessed as follows:

Two Mid-semester Tests:	8% (4% each)
Two Assignments:	8% (4% each)
Online Quizzes:	12%
Tutorial work:	12%
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/2008/ug-bachelor-degree-rules.pdf>.

### ***Assignments:***

There will be two compulsory assignments. They are to be handed in at the tutorial on 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, 9<sup>th</sup> April (week 7)  
Assignment 2 Due: Wednesday, 28<sup>th</sup> May (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.handbook.mq.edu.au/PDFs/2008/ug-plagiarism.pdf>. 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, 2<sup>nd</sup> April  
Week 10, 14<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. All necessary statistical formulae will be provided.

### ***Final Examination***

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

For the Final examination you are allowed to bring in one A4 page of handwritten notes, written on both sides. All necessary statistical tables and formulae 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.sss.mq.edu.au/equity/index.htm>. 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 available from

[http://www.efs.mq.edu.au/ss/important\\_processes/special\\_consideration](http://www.efs.mq.edu.au/ss/important_processes/special_consideration).

Students should read the DEFS' information regarding supplementary exams,

[http://www.efs.mq.edu.au/ss/important\\_processes/special\\_consideration](http://www.efs.mq.edu.au/ss/important_processes/special_consideration)

**STAT273 Introduction to Probability**

**UNIT SCHEDULE  
Semester 1, 2008**

<b>WEEK</b>	<b>LECTURE TOPIC</b>	<b>To Do</b>
25 Feb <i>W1</i>	Experiments, sample spaces, Probability Rules, Permutations and Combinations Theoretical vs. Empirical probability	Quiz 1, Practice Ex 1
3 March <i>W2</i>	Conditional Probability Independence, Bayes' Theorem	Quiz 2, Prac Quiz 2, Practice Ex 2
10 March <i>W3</i>	Random Variables Probability Functions, Discrete Probability Distributions, Cumulative Distribution functions, Expected value and Variance	Quiz 3, Prac Quiz 3, Practice Ex 3
17 March <i>W4</i>	Discrete Distributions; Bernoulli, Binomial, Geometric, Poisson.	Quiz 4, Prac Quiz 4, Practice Ex 4
24 March <i>W5</i>	More Discrete Distributions; Negative Binomial and Hypergeometric.	Quiz 5, Tutorial 5, Practice Ex 5
31 March <i>W6</i>	Introduction to Continuous random variables	Quiz 6, Tutorial 6, Practice Ex 6 <b>Test 1</b>
7 April <i>W7</i>	Cumulative distribution function Functions of Random Variables, Sampling distributions, Uniform and Exponential Distributions	Quiz 7, Tutorial7, Practice Ex 7 <b>Assignment 1 due</b>
<b>Midsemester Break: 12<sup>th</sup> – 27<sup>th</sup> April</b>		
28 April <i>W8</i>	Normal Distribution Model checking, Central Limit Theorem, Normal Approximations	Tutorial 8, Practice Ex 8
5 May <i>W9</i>	Gamma Distributions, Beta Distributions Tchebysheff's Theorem	Quiz 9, Tutorial 9, Practice Ex 9
12 May <i>W10</i>	Chi-squared Distribution, Distribution of sample variance, F-Distribution, Test for Equality of Variance, t- Distribution, Distribution of sample mean ( $\sigma$ unknown)	Quiz 10, Tutorial 10, Practice Ex 10 <b>Test 2</b>
19 May <i>W11</i>	Joint Distributions: Discrete and Continuous cases	Quiz 11, Tutorial11, Practice Ex 11
26 May <i>W12</i>	Introduction to Markov Chains States, Transition probabilities, State vectors, Equilibrium, Absorbing States	Quiz 12, Tutorial12, Practice Ex 12 <b>Assignment 2 due</b>
2 June <i>W13</i>	Review	Review Quiz, Tutorial 13