



The University of Southern Queensland

Course Specification

Description: Distribution Theory

| Subject | Cat-Nbr | Class | Term | Mode | Units | Campus |
|---------|---------|-------|---------|------|-------|--------|
| STA | 2301 | 20383 | 1, 2003 | EXT | 1.00 | TWMBBA |

| | |
|------------------------|--------|
| Academic Group: | FOSCI |
| Academic Org: | FOS003 |
| HECS Band: | 2 |
| ASCED Code: | 010103 |

STAFFING

Examiner: Peter Dunn
Moderator: Shahjahan Khan

PRE-REQUISITES

Pre-requisite: STA2300 and MAT1102

RATIONALE

To develop the methodology of statistics in subsequent courses, an understanding of the concepts and theory of probability and probability distributions is required and is provided by this course.

SYNOPSIS

This course introduces students to the elements of probability and distribution theory. The topics include probability, random variables and their distributions, expectation, moment generating functions, standard discrete and continuous distributions, bivariate distributions, transformation techniques and sampling distributions related to the normal distribution.

OBJECTIVES

On successful completion of this course students will be able to:

- compute probabilities for various situations;
- derive some standard discrete and continuous probability distributions and apply them appropriately;
- derive the marginal and conditional distribution of random variables;
- compute the conditional mean and variance from given bivariate distribution;
- understand the concept and applications of the moment generating function;
- obtain the distribution of transformed variables defined on one and two dimensional space;

- derive the sampling distributions of some statistics;
- use a computer package to solve relevant statistical problems when appropriate.

TOPICS

| Description | Weighting (%) |
|---|---------------|
| 1. Probability - sample spaces and events, probability axioms, conditional probability, Bayes' Theorem, permutations and combinations. | 15.00 |
| 2. Random Variables - discrete, continuous and mixed, mass functions, density functions, distribution functions, bivariate distributions, marginal and conditional mass and density functions | 15.00 |
| 3. Expectation and Moments - mathematical expectation, algebra of expectations, covariance, conditional expectation, moments, moment generating functions | 15.00 |
| 4. Standard Discrete Distributions - uniform, Bernoulli, binomial, geometric, negative binomial, hypergeometric Poisson | 15.00 |
| 5. Standard Continuous Distributions - uniform, gamma, exponential, normal, bivariate normal | 15.00 |
| 6. Transformations - distribution function, moment generating function and change of variables methods applied to discrete and continuous random variables in one and two dimensions | 15.00 |
| 7. Sampling Distributions (t, F and chi-squared), Central Limit Theorem. | 10.00 |

TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at <http://bookshop.usq.edu.au> by entering the author or title of the text.

MATLAB, current version, Student Edition, CD and Users Guide.

Wackerly, D.D 2002, *Mathematical Statistics with Applications*, 6th edition, Duxbury, Belmont.

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

MATLAB, current version, Student Edition, CD and Users Guide.

Berry, D.A., & Lindgren, B.W 1996, *Statistics: Theory & Methods*, 2nd edition, Duxbury Press, Belmont.

Freund, J.E., & Walpole, R.E 1992, *Mathematical Statistics*, 5th edition, Prentice-Hall, Englewood Cliffs.

Hogg, R.V., & Craig, A.T 1995, *Introduction to Mathematical Statistics*, 5th edition, Prentice Hall, Englewood Cliffs.

Larsen, R.J., and Marx, M.L 1986, *An Introduction to Mathematical Statistics and its Applications*, 2nd edition, Prentice-Hall, Englewood Cliffs.

STUDENT WORKLOAD REQUIREMENTS

| ACTIVITY | HOURS |
|---------------|-------|
| Assessment | 20 |
| Private Study | 150 |

ASSESSMENT DETAILS

| Description | Marks Out of | Wtg(%) | Required | Due Date |
|---------------------|--------------|--------|----------|-----------------------|
| ASSIGNMENT 1 | 100.00 | 10.00 | Y | 17 Mar 2003 |
| ASSIGNMENT 2 | 100.00 | 10.00 | Y | 14 Apr 2003 |
| ASSIGNMENT 3 | 100.00 | 10.00 | Y | 26 May 2003 |
| EXAM 3HR RESTRICTED | 100.00 | 70.00 | Y | END S1 (see note) |

NOTES:

- . Examination dates will be available during the Semester. Please refer to Examination timetable when published.

IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:
There are no attendance requirements for this course. However, it is the students' responsibility to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:
To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available for each assessment item.
- 3 Penalties for late submission of required work:
If students submit assignments after the due date without prior approval then a penalty of 10% of the total marks available for the assignment will apply for each working day late.
- 4 Requirements for student to be awarded a passing grade in the course:
To be assured of a passing grade, students must demonstrate, via the summative assessment items, that they have achieved the required minimum standards in relation to the objectives of the course by satisfactorily completing all summative assessment items (the examination and assignments).
- 5 Method used to combine assessment results to attain final grade:

The final grades for students will be assigned on the basis of the weighted aggregate of the marks obtained for each of the summative assessment items in the course.

6 Examination information:

In a Restricted Examination, candidates are allowed access to specific materials during the examination. The only materials that candidates may use in the restricted examination for this course are: writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination) and Formula sheets as provided by the Examiner with the examination paper. Students whose first language is not English, may, with the Examiner's approval, take an appropriate non- electronic translation dictionary into the examination. Students who wish to use a translation dictionary **MUST** request and receive written approval from the Examiner at least one week before the examination date. Translation dictionaries will be subject to perusal and may be removed from the candidate's possession until appropriate disciplinary action is completed if found to contain material that could give the candidate an unfair advantage.

7 Examination period when Deferred/Supplementary examinations will be held:

Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.

8 University Regulations:

Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/SECARIAT/calendar/Part5/> or in the printed version of the current USQ Handbook.

ASSESSMENT NOTES

- 9 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner. Students must retain a copy of each item submitted for assessment. This must be produced within five days if required by the Examiner. The examiner may grant an extension of the due date of an assignment in extenuating circumstances.