



The University of Southern Queensland

## Course Specification

### Description: Distribution Theory

Subject	Cat-Nbr	Class	Term	Mode	Units	Campus
STA	2301	10383	1, 2002	ONC	1.00	TWMBA

<b>Academic Group:</b>	FOSCI
<b>Academic Org:</b>	FOS003
<b>HECS Band:</b>	2
<b>ASCED Code:</b>	010103

### STAFFING

Examiner: Peter Dunn  
Moderator: Shahjahan Khan

### PRE-REQUISITES

Pre-requisite: STA 2300 and MAT 1102

### 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 function, standard discrete and continuous distributions, bivariate distributions, transformation techniques and sampling distributions.

### 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 as 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

Introductory Book, 2002 *STA2301 Distribution Theory*, USQ Distance Education Centre, Toowoomba.

Mendenhall, W. et al 1996 *Mathematical Statistics with Applications*, 5th or 6th edn, Duxbury, Belmont.

Study Book, 2002 *STA2301 Distribution Theory*, USQ Distance Education Centre, Toowoomba.

## 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.

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

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

Hogg, R.V. & Craig, A.T. 1978 *Introduction to Mathematical Statistics*, 4th edn, Macmillan, New York.

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

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	10
Lectures	26
Private Study	105
Tutorial	26

## ASSESSMENT DETAILS

Description	Marks Out of	Wtg(%)	Required	Due Date
ASSIGNMENT 1	100.00	10.00	Y	04 Mar 2002 (see note 1)
ASSIGNMENT 2	100.00	10.00	Y	04 Mar 2002 (see note 2)
ASSIGNMENT 3	100.00	10.00	Y	04 Mar 2002 (see note 3)
EXAM 3HR RESTRICTED	100.00	70.00	Y	END S1 (see note 4)

### NOTES:

1. Further details about the due dates are detailed in the assessment section of the Course Specifications.
2. Further details about the due dates are detailed in the assessment section of the Course Specifications.
3. Further details about the due dates are detailed in the assessment section of the Course Specifications.
4. Examination dates will be available during the Semester. Please refer to Examination timetable when published.

## OTHER REQUIREMENTS

- 1 Attendance Requirements: It is the students' responsibility to actively participate in all classes scheduled for them, and to study all material provided to them or required to be accessed by them to maximize their chance of meeting the objectives of the course and to be informed of course-related activities and administration.

- 2 Requirements to Satisfactorily Complete Each Assessment Item: To satisfactorily complete the assignments and examination, students must obtain at least half of the marks available for each assignment and the examination.
- 3 Minimum Requirements to Pass the Course: To be assured of a pass in this course, students must: (a) obtain at least 50% of the marks available in the examination; and (b) obtain 50% of the marks available for the assignments overall.
- 4 Grading: Final grades for students will be determined by the addition of the marks obtained in each assessment item, weighted as in the Assessment Details and by considering the students' level of achievement of the objectives of the unit.
- 5 Supplementary and Deferred Examinations: Students who obtain an overall passing mark, but who do not perform satisfactorily in an examination, may, at the discretion of the examiner, be granted a supplementary examination. Students will be granted a deferred examination only if they perform satisfactorily in all other assessment items. Any supplementary or deferred examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 6 Assignments: 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 two days if required by the examiner. In accordance with the University's Policy on Assignments (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances. This policy may be found in the USQ Handbook, the Distance Education Student Guide and the Faculty of Sciences' Orientation Handbook for new on-campus students. All students are advised to study and follow the guidelines associated with this policy. An assignment, submitted after the due date without an extension approved by the Examiner, will attract a penalty of 10 percent of the assigned mark for each working day (of part thereof) that the assignment is late.
- 7 Examinations: Candidates should be aware that the University has policies and regulations (Regulation 5.6.2.2) about the use of unfair means and electronic devices in an examination and they should refer to them to determine whether or not actions they intend to take are acceptable to the University. Restricted Examination: Candidates will be allowed access only to specific materials in a restricted examination. The only materials that candidates may use in the restricted examination for this course are : (a) writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); (b) 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). With the approval of the examiner, candidates may take an appropriate non-electronic translation dictionary into the examination. This 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.
-