



The University of Southern Queensland

Course Specification

Description: Advanced Statistical Methods

Subject	Cat-Nbr	Class	Term	Mode	Units	Campus
STA	4302	14382	2, 2002	ONC	1.00	TWMBBA

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

STAFFING

Examiner: Peter Dunn
Moderator: Henry Eastment

RATIONALE

Statisticians need to be proficient in a wide range of statistical techniques. Many of these are either only touched on or omitted from undergraduate programs. An opportunity to broaden the knowledge base and more advanced statistical techniques are provided in this course.

SYNOPSIS

This course contains advanced statistical methods selected from topics including but not restricted to: statistical inference, multivariate analysis, order statistics, computational methods, statistical quality control, and reliability analysis.

OBJECTIVES

On completion of this course, students should be able to:

- identify the technique or techniques needed to deal with a statistical problem;
- demonstrate the skills needed to address the statistical problem so as to provide an appropriate statistical analysis;
- understand some of the advanced statistical methods;
- read, understand and present publications in statistics of a technical nature;
- demonstrate understanding of Philosophy and method of Bayesian inference;
- demonstrate, depending on options chosen, knowledge and understanding of multivariate analysis, order statistic and computational methods and quality control and reliability.

TOPICS

Description	Weighting (%)
1. PART A - Inferential Statistics 1 Parametric Estimation: methods of estimation; properties of estimators - unbiasedness, consistency, efficiency, loss/risk functions; sufficiency, complete sufficiency, exponential family, uniformly minimum variance unbiased estimator; interval estimation; Bayesian estimation - point and interval. 2 Tests of Hypothesis: power function, most powerful test, generalised likelihood ratio test, uniformly most powerful test, minimax test, Bayes test. AND EITHER	60.00
2. PART B - Multivariate Analysis 1 Multivariate Distributions: multivariate normal, Hotelling's T-square, Student-t, Wishart 2 Estimation and Tests: estimation of mean vector and covariance matrix, sampling distribution of sample mean vector and covariance matrix, tests about mean and covariance in one and two sample cases. OR PART C - Order Statistics & Computational Methods 1 Order Statistics: distribution of order statistics (o.s.) and functions of o.s., asymptotic distributions, sample cumulative distribution function, tolerance limits 2 Computational Methods: bootstrapping, jackknifing, randomization technique OR PART D - Quality Control and Reliability 1 Quality Control: sequential analysis, acceptance sampling, process control, Taguchi method 2 survival analysis, censored & truncated data, extreme-value distribution	40.00

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.

To be advised.

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.

Anderson, T.W 1984, *An Introduction to Multivariate Statistical Analysis*, 2nd edition, Wiley, New York.

Box, G.E.P. & Tiao, G.C 1992, *Bayesian Inference in Statistical Analysis*, Wiley, New York.

Cox, D.R. & Hinkley, D.V 1974, *Theoretical Statistics*, Chapman Hall, New York.

Mood, A.M., Graybill, F.A. & Boes, D.C 1974, *Introduction to the Theory of Statistics*, 3rd edition, McGraw-Hill, New York.

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Directed Study	165

ASSESSMENT DETAILS

Description	Marks Out of	Wtg(%)	Required	Due Date
ASSESSMENT NEGOT WITH EXAM	100.00	100.00	Y	END S2 (see note 1)

NOTES:

1. Assessment will be notified by Examiner.

OTHER REQUIREMENTS

- 1 To be assured of a pass in this course, students must obtain : (a) an overall mark of at least 60%; (b) at least 50% of marks in the final exam, if applicable; (c) an overall mark of at least 50% in the assignments; and (d) at least 50% of marks in the project/presentation, if applicable.
 - 2 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.
 - 3 Enrolment in this course is subject to the approval of the examiner.
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