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MATH10282

Introduction to Statistics

Unit code:	MATH10282
Credit Rating:	10
Unit level:	Level 1
Teaching period(s):	Semester 2
Offered by	School of Mathematics
Available as a free choice unit?:	N

Requisites

Prerequisite

- [MATH10141 - Probability 1](#) (Compulsory)

Aims

The aims of this course unit are to help students

develop a knowledge of basic statistical concepts and methodology which build on the ideas in probability studied in MATH10141;

develop practical statistical skills.

Overview

The course gives a general introduction to statistics and is a prerequisite for all future statistics courses.

Assessment methods

- Other - 20%
- Written exam - 80%

Assessment Further Information

Two coursework assignments (20%) plus a two hour end of semester examination (80%).

Learning outcomes

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

understand introductory statistical ideas and methodology;

use the statistical computing software R to analyse data.

Future topics requiring this course unit

The statistics content is required for MATH20802, Statistical Methods and MATH20812, Practical Statistics 1. The background in R is also very useful for MATH20812, Practical Statistics I.

Syllabus

Populations and samples, random sampling. [1]

Representing sample data the histogram, boxplot, numerical summary measures. [2]

Probability models for data. [2]

Sampling distributions of sample statistics - the sample mean and its distribution under Normality, using the Central Limit Theorem, the sample proportion, the sample variance, the chi-squared distribution. [2]

Point estimation the bias and variance of an estimator, choosing between competing estimators. [2]

The likelihood function and maximum likelihood estimators for discrete variables. [2]

Confidence intervals. Single sample procedures for a Normal mean and variance, the population proportion. Two sample procedures for the difference between two Normal means and the difference between two population proportions. [3]

Hypothesis testing introductory ideas and concepts. [2]

Tests based on a single sample the Normal mean (variance known and unknown), the Normal variance, a non-Normal mean parameter, the Binomial probability parameter. Relationship between CIs and hypothesis testing. [3]

Calculation of the probability of rejecting the null for a given value of the population parameter. [1]

Tests based on two independent samples for differences between two Normal means, two non-Normal means, two population proportions. [2]

Recommended reading

G M Clarke and D Cooke, A Basic Course in Statistics (Fourth Edition) Oxford University Press, 1998;

Robert V Hogg, Introduction to Mathematical Statistics (Sixth Edition) Prentice Hall, 2005;

Sheldon M Ross, Introduction to Probability and Statistics for Engineers and Scientists (Third edition) Elsevier Science, 2004;

Michael J Crawley, Statistics: An Introduction Using R. John Wiley & Sons Ltd, 2007

Feedback methods

Tutorials will provide an opportunity for students' work to be discussed and to provide feedback on their understanding.

Study hours

- Lectures - 22 hours
- Tutorials - 11 hours
- Independent study hours - 67 hours

Teaching staff

Ian McHale - Unit coordinator