



## MATH10282 - 2010/2011

### General Information

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- Title: Introduction to Statistics
- Unit code: MATH10282
- Credits: 10
- Prerequisites: A-Level Mathematics, MATH10141 *Probability 1*
- Co-requisite units: None
- School responsible: Mathematics
- Members of staff responsible: Dr P Foster

## Specification

### 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.

### Brief Description of the unit

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

### 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 1*.

### Syllabus

- Populations and samples, sample statistics, graphical summaries, probability models for data; [4]
- Point estimators and their sampling distributions; How good are sample statistics as estimators of population parameters? [2]
- The likelihood function and maximum likelihood estimators for discrete variables; [2]
- Confidence intervals; [1]
- Hypothesis testing – introductory ideas and concepts; [2]
- Tests based on a single sample – the Normal mean (variance known), the Binomial probability parameter; Relationship between CI's and hypothesis testing; [2]
- Calculation of the probability of rejecting the null for a given value of the mean; [2]
- Chi-square distribution - confidence intervals and tests on the variance of a Normal distribution, goodness-of-fit tests; [1]
- t-distribution - confidence intervals and tests on Normal mean with variance unknown; [1]
- Tests based on two independent samples; [3]

- One-way ANOVA – an introduction. [2]

## **Textbooks**

- 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

## **Teaching and learning methods**

Two lectures per week plus either an examples class or computing workshop. There will be 5 computing workshops and 6 examples classes. In addition, students are expected to do at least five hours private study each week on this course unit.

## **Assessment**

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

## **Arrangements**