MANCHESTER 1824

MATH10141 - 2006/07

General Information

- Title: Probability and Statistics 1
- Unit code: MATH10141
- Credits: 10
- Prerequisites: A-Level Mathematics
- Co-requisite units: None
- School responsible: Mathematics
- Member of staff responsible: Dr. Peter Neal

Specification

Aims

The aims of this course are to introduce the basic ideas and techniques of probability and statistics, including the handling of probability distributions, the crucial notions of conditional probability and of independence, and the estimation of populations means and variances.

Brief Description of the unit

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

Learning Outcomes

On successful completion of this module students will have

- a good appreciation of the basic laws of probability;
- the skills to tackle simple problems on probability distributions;
- a basic understanding and working knowledge of statistics such as sample mean and variance, estimators and unbiasedness.

Future topics requiring this course unit

All probability and statistics course units.

Syllabus

1. Random experiments, sample space and events, the algebra of events (sets, unions, intersections, complementations, De Morgan's laws). Axioms of probability. Equally likely events. [5]
2. Conditional probability of an event. Multiplication rule. Partition theorem, Bayes theorem and applications. Independent events. [4]
3. Random variables. Definition. Distribution function. Discrete random variables and probability mass function. Continuous random variables, probability density function and its relation to the distribution function. Calculating probabilities of events defined by random variables. Finding the distribution function of random variables using equivalent events (simple cases). [3]
4. Expectation of a random variable and of a function of a random variable. Variance of a random variable. Basic properties of expectation and variance. [2]
5. The Binomial, Normal and Poisson distributions. [3]
6. Bernoulli trials. The geometric and negative binomial distribution. The sample proportion as an estimator to the general proportion. Poisson and Normal approximation to Binomial. [3]
7. 7. Random samples and populations. Simple statistics and their distributions. Sample mean as an estimator of the population mean. Properties of the sample mean. Sample variance as an estimator of the population variance. Unbiasedness. [4]

Textbooks

- S. Ross. <u>A First Course in Probability</u>, 4th edition, Macmillan.
- D. Stirzaker. Elementary Probability, Cambridge University Press. <u>Available electronically</u>
- J. McColl. <u>Probability</u>, London : Edward Arnold, 1995.

Teaching and learning methods

Two lectures and one examples class each week.

Assessment
    Coursework; Weighting within unit 20%
    Two hours end of semester examination; Weighting within unit 80%

Arrangements