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The University of Manchester

MATH10141 – 2014/2015

Probability 1

Unit code:	MATH10141
Credit Rating:	10
Unit level:	Level 1
Teaching period(s):	Semester 1
Offered by	School of Mathematics
Available as a free choice unit?:	N

Requisites

None

Aims

The aims of this course are to introduce the basic ideas and techniques of probability, including the handling of random variables and standard probability distributions and the crucial notions of conditional probability and of independence.

Overview

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

Assessment methods

- Other - 20%

- Written exam - 80%

Assessment Further Information

- Coursework; Weekly in class tests in the computer cluster, weighting within unit 20%
- Two hours end of semester examination; Weighting within unit 80%

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.

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. Combinatorial probability. [4]
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 (discrete functions only). [3]
4. Expectation and variance of a random variable and of a function of a random variable (including standardising). Basic properties of expectation and variance. [2]
5. Probability distributions including the Binomial, Geometric, Poisson, Normal and Exponential distributions. Standardisation of Normal variables. Poisson and Normal approximation to Binomial. [3]
6. Independent random variables. Expectation and variance of a linear combination of independent random variables. Discussion of the Normal case. [2]
7. Independent trials. Chebychev's inequality. Weak Law of Large Numbers. The Central Limit Theorem. [4]

Recommended reading

- S. Ross. A First Course in Probability, Macmillan.
- D. Stirzaker. Elementary Probability, Cambridge University Press. Available electronically

- J. McColl. Probability, London : Edward Arnold, 1995.
- N.A. Weiss, A Course in Probability, Pearson.

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

Jonathan Bagley - Unit coordinator