MTH4108 Probability I – 2009/10

Key Learning Objectives

Below are the most important things you should have learnt from the course. To obtain a bare pass in the examination, you should be able to do all of the following. This is NOT a complete syllabus; for that you should look on the department webpage for the course.

1. Know and be comfortable with using basic set notation and terminology.
2. Know the definition of and be comfortable with using functions. Understand what it means for functions to be injective, surjective and bijective.
3. Write down the sample space for simple experiments, including sampling with replacement (such as tossing coins or rolling dice), sampling without replacement, and Bernoulli trials with stopping rules.
4. Calculate probabilities in straightforward instances of the above types of experiment.
5. Know the Kolmogorov axioms and make simple deductions from them.
6. Calculate the probability of the complement of an event; and of the union of two disjoint events.
7. State and use the inclusion-exclusion formula for two events.
8. Define and recognise independent events. Use independence to calculate probabilities.
9. Define conditional probability and calculate it.
10. Know the Theorem of Total Probability and use it in the case of a partition of the sample space into two events.
11. Understand the probability mass function of a discrete random variable.
12. Understand the cumulative distribution function and the probability density function of a continuous random variable, and be able to find each from the other.
13. Find the expectation and variance of discrete and continuous random variables.
14. Know the main properties of Bernoulli, binomial, geometric, Poisson, uniform and exponential random variables.