School of Mathematics

ST2351 — Probability and Theoretical Statistics I

(SF & JS Mathematics and Two-Subject Moderatorship)

Lecturer: Prof. Simon Wilson & Dr. Brett Houlding

Requirements/prerequisites: ST1252

Duration: 11 weeks

Number of lectures per week: 3 lectures per week including some tutorials

Assessment:

ECTS credits: 5

End-of-year Examination: This module will be examined jointly with MA2352 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 2 hour examination. However there will be separate results for MA2351 and MA2352.

Description:

Aims: This module will describe the fundamentals of probability theory, from the basic axioms of probability to the most commonly used aspects and theorems of the theory. Syllabus

- Events and Probabilities
- The laws of probability
- Independence and conditional probability
- Discrete random variables
- Probability generating functions
- Continuous random variables
- Multivariate distributions & independence
- Moment and characteristic generating functions
- The law of averages
- The central limit theorem
- An introduction to simulation (if time permits)
- Examples and past exam questions

Textbooks:

2010-11

- Probability: an Introduction by Grimmett and Welsh, published by Oxford University Press.
- Introduction to Probability Models by Ross, published by Academic Press (10th edition).

Learning Outcomes: On successful completion of this module, students will be able to:

- Derive the probability space for simple experiments, and prove simple properties of probabilities from its definition;
- Identify when random variables are independent, and derive conditional distributions and expectations;
- Define the most common discrete and continuous random variables, and compute their moments and probability, moment and characteristic generating functions where appropriate;
- Define a multivariate distribution and calculate marginal and conditional distributions from it;
- State and prove the laws of averages and of central limit.

May 1, 2011