

## School of Mathematics

**Module ST1251 — Introduction to Statistics I**  
( JF Mathematics, JF & SF Two-subject Moderatorship )

2009-10

**Lecturer:** Eamonn Mullins, Senior Lecturer in Statistics

**Requirements/prerequisites:**

**Duration:** Michaelmas term, 11 weeks (plus 1 study week)

**Number of lectures per week:** 2 lectures and 1 tutorial per week

**Assessment:** See below

**End-of-year Examination:** This module will be examined jointly with ST1252 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 1.5 hour examination. One examination split into two parts: those who take only the first semester will take part A, those who take the both semesters will take both parts of the examination. The duration of part A will be one and a half hours, both parts will be allocated three hours. Each part of the paper will contain two compulsory questions.

**Description:** This has been taught as a single module until this year (see <http://www.maths.tcd.ie/pub/official/Courses01-02/151.html>) (it is described as 151 on the examinations papers part of the TCD local website (see [http://www.tcd.ie/Local/Exam\\_Papers/](http://www.tcd.ie/Local/Exam_Papers/))). This year, the first semester may be taken as a separate module (ST1251) and the examination structure will reflect this. For the purposes of the examination board, the two semesters will be examined separately, but there will be a single three-hour examination (for those who take the both semesters).

These modules are an introduction to probability models and both statistical ideas and methods. The fundamental concepts are introduced in the context of a series of practical problems of varying complexity.

The topics covered will include:

Elementary probability ideas; discrete probability models, including binomial, hypergeometric, geometric, Poisson; continuous distributions including Normal, uniform and exponential; expectations and variances of random variables; combining random variables; sampling distributions.

Statistical variation; parameter estimation; statistical tests and their properties; design and analysis of comparative studies for both binary and continuous variables; introductions to Analysis of Variance (ANOVA), regression and contingency tables.

The theory will be illustrated by examples from biology, engineering, industry, medicine and the social sciences.

### Texts

I will provide many handouts and problem sheets during the modules; the problems are typically taken from old examination papers and so they are the best guide to what you are required to know at the end of the year. The problems will be solved by the class tutor during tutorials.

The following is a good general reference, particularly for the second semester module

(ST1252). The book is quite discursive, as it is oriented to a general, rather than a specifically mathematically oriented student readership. The modules are not based on the book, but it does provide a second view on what statistics is about and many interesting examples from a variety of disciplines.

D.S. Moore and G. P. McCabe, Introduction to the practice of statistics, Freeman, 5th edition, 2006

A more mathematical approach is taken by Ross, though his readers, as the title states, are expected to be those who are comfortable with mathematics rather than those following a mathematical career.

Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", Wiley, 1987, [also Harcourt/Academic 2000].

Another book which you may like to consult for additional reading:

Chatfield, C., "Statistics for Technologists", 3rd edition, Chapman and Hall, London, 1983.

## Examinations and Coursework

### Coursework

The coursework for the first semester will consist of two assessment exercises. They will each involve a set of problems which will be marked by the course tutor. The first set will be handed out at the end of week 6 and must be submitted at the beginning of week 8 [week 7 is a Reading Week]. The second will be handed out at the end of semester 1 and must be submitted at the beginning of semester 2

The coursework for the second semester (ST1252) will also consist of two assessment exercises. The first will be handed out at the end of week 6 and must be submitted at the beginning of week 8 [week 7 is a Reading Week]. The second will be handed out towards the end of the second semester (probably about week 9 or 10; you will be forewarned at least a week in advance) and must be submitted a week later.

For each semester the assessments will be weighted as follows:

Assessment	Weight
Reading week	0.3
End of semester	0.7

### Annual Examinations

The end of year examination will have two questions from each semester, both of which must be attempted. Note that the two parts of the examination will be marked separately and there will not be any cross compensation between the two parts.

**Combining Marks** The final mark for each part of the course will be determined as follows:

$\text{Max}\{0.2 \text{ Coursework} + 0.8 \text{ Examination Mark}, \text{Examination Mark}\}$ .

### Tutorials

In addition to the examinable assessments, sets of problems will be handed out during lectures. These will form the basis of the tutorials which will be held most weeks (note that there will be no tutorials in the first week of each semester). These problems represent the best way of assessing your progress. If you can handle these problems, you will be well prepared for the end of year examinations. If, after the tutorials, you are still having difficulties in solving them, come and talk to me (email to arrange appointment).