Module Details for ST2005 APPLIED PROBABILITY II

**Current Record**
Module Details

**Module Code**  ST2005

**Module Name**  ST2005 APPLIED PROBABILITY II

**ECTS weighting**  5

**Semester/term taught**  Semester 2

**Contact Hours**  3 lectures per week including some tutorials and software labs

**Module Personnel**  Lecturer – Dr Jason Wyse

**Learning Outcomes**  At the end of this module, students should be able to:

- Derive confidence intervals and hypothesis tests for means and variances
- Derive prediction intervals for simple statistical models and explain how they differ from confidence intervals
- Define maximum likelihood estimates and how compute them
- Implement a bootstrap to construct confidence intervals
- Construct a q-q plot and use simple transformations of data that can make it more normally distributed
- Construct a probability plot for any given distribution where its
distribution function is known

Calculate the properties of multivariate distributions

Derive marginal and conditional probabilities of the bivariate normal distribution

**Module Learning Aims**

This module will develop several important ideas in statistical analysis making use of some of the ideas introduced in ST2004. It acts as a bridge to the sophister years by introducing the fundamental ideas that are used in the more advanced statistics modules that will take place then.

**Module Content**

- Recap: derivation of the confidence interval and tests of hypothesis for normal data; the difference between a confidence interval and a prediction interval
- The Central Limit Theorem and what it says about confidence intervals and tests of hypothesis
- The bootstrap approach to confidence intervals and tests of hypothesis
- Introduction to maximum likelihood estimation and computation
- The q-q plot and transforming data to make it more Gaussian
- Introduction to multivariate distributions

**Recommended Reading List**

**Module Pre Requisite**

ST1002, ST2004

**Module Co Requisite**

**Assessment Details**

ST2005: 15% continuous assessment in the form of labs, 85% written examination through a 2 hour exam in Trinity term.