MATH0057 (Probability and Statistics)

Year:	2018–2019
Code:	MATH0057
Old Code:	MATH7501
Level:	5 (UG)
Normal student group(S):	Year 2 and 3 Mathematics degrees
Value:	15 credits (= 7.5 ECTS credits)
Term:	2
Structure:	3 hour lectures per week, 1 hour problem class. Assessed coursework.
Assessment:	90% examination, 10% coursework. In order to pass the module you must have at least 40% for both the examination mark and the final weighted mark.
Normal Pre-requisites:	MATH0011(previously MATH1402)
Lecturer:	Dr M Rassias (Department of Statistics)
Problem class teacher:	Dr I Strouthos

Course Description and Objectives

The aim of the course is to introduce students to the theory of probability and some of the statistical methods based upon it. Many physical processes involve random components which can only be modelled using probabilistic methods. Statistical theory is vital for analysing scientific data where it is necessary to distinguish genuine patterns from random fluctuations.

Recommended Texts

Wackerley, Mendenhall and Scheaffer, *Mathematical Statistics with Applications* (6th edition), Duxbury Press.

Detailed Syllabus

- Axiomatic approach to probability; standard discrete and continuous distributions (Bernoulli, binomial, geometric, negative binomial, hypergeometric, Poisson, uniform, exponential, gamma, beta, normal), their properties and uses; idea of Poisson process.
- Joint probability distributions: joint and conditional distributions and moments; iterated expectation; multinomial and multivariate normal distributions.
- Moment and probability generating functions; properties; sums of independent random variables.
- Statement of weak law of large numbers.
- Statement of the Central Limit Theorem.
- Introduction to statistics. Data, estimation and hypothesis testing.
- Normal probability models. χ^2, t and F distributions. Confidence intervals.
- Regression and correlation. Least-squares.