

MODULE SPECIFICATION - AS2101 - Probability & Statistics 2**Introduction**

This document outlines core information regarding a module. The information is regularly reviewed by the University and should be read in parallel with the relevant programme specification.

Module Title	Probability & Statistics 2
Module Reference Code	AS2101
Home School	Cass Business School
Home Department	UG Programme (Cass Business School)
Module Credits	25
Module Level	Level HE2

Module Rationale

The course is fundamental to all further study of statistical methods and in particular is a prerequisite for Statistics and Probabilistic Modelling for Insurance (CT6), a core (and professional) subject at Part 3. It is also the second part of the Institute and Faculty of Actuaries' subject CT3.

Educational Aims

To demonstrate via probabilistic techniques the foundations of theoretical statistics;
To examine the theoretical basis for estimation;
To explore multiple regression and analysis of variance and the principles of data exploration and analysis;
To demonstrate the use of data analysis software.

Outline Content

Probability. Moment, cumulant and probability generating functions; sums of random variables and convolutions of distributions; Central Limit Theorem. Linear combinations of random variables. Marginal and conditional distribution. Distribution of a function of a random variable. Covariance and correlation, conditional expectations. Compound distributions.
Estimation. Properties of estimators. Likelihood. Method of moments, method of maximum likelihood; asymptotic distribution of maximum likelihood estimator.
Correlation and Regression. Correlation; testing significance of sample correlation.
Simple and multiple regression: significance testing, prediction interval. R². Residual analysis.
One-way Analysis of Variance. Estimation and testing, balanced and unbalanced.
Data Analysis Using Microsoft Excel

Charts; estimates and confidence intervals; simple and multiple regression, ANOVA.

Learning Outcomes

On successful completion of this module, a student will be expected to be able to:

Knowledge and Understanding

Use generating functions to obtain probability distributions

Understand problems involving more than one random variable

Demonstrate knowledge of methods of finding estimators and discuss their properties

Use conditional expectation to study compound distributions.

Subject Specific Skills

Carry out and interpret analysis of variance and simple and multiple regression

Use a spreadsheet package to perform statistical tasks.

Transferable Skills

work as a team on a group project

present a report on a group project

Learning and Teaching Methods

Lectures, worked examples, structured programme of non-assessed student exercises
Laboratory based classes using sample data sets.

MODULE TEACHING PATTERN

<i>Teaching Component</i>	<i>Type</i>	<i>Contact Hours</i>	<i>Self Directed Study Hours</i>	<i>Total Student Learning Hours</i>
Lectures	Lecture	40	160	200
Laboratory sessions (Term 2)	Lab	10	40	50
Totals		50	200	250

Module Relationships

Pre-requisite Relationships

<u>Module Code</u>	<u>Module Title</u>
AS1101	Probability and Statistics I

Co-requisite Relationships

<u>Module Code</u>	<u>Module Title</u>
AS2051	Calculus and Linear Algebra (Maths 2)

Non-requisite Relationships

Assessment Methods

Coursework, group project and exam

Module Pass Requirements

Module Pass Mark 40

Module Assessment

<i>Assessment Component</i>	<i>Assessment Type</i>	<i>Weighting</i>	<i>Minimum Qualifying Mark</i>	<i>Pass/Fail</i>
Coursework 1	Coursework	6	40	No
Coursework 2	Coursework	6	40	No
Examination	Exam (Unseen)	80	40	No
Group Project using Excel	Coursework	8	40	No

Indicative Reading List

Introduction to Mathematical Statistics, Robert Hogg and Allen Craig (Collier Macmillan, 1986) Introduction to Probability and Mathematical Statistics, L J Bain & M Engelhardt (Duxbury Press, 1992)
John E. Freund's Mathematical Statistics with Applications, 7th ed., by Miller and M. Miller (Pearson Prentice Hall, 2004)
Introduction to probability models, 9th ed. Sheldon M. Ross (Academic Press, 2006)

HESA Codes

Code	Description	Price Group
24	Mathematics	C

JACS Codes

Code	Description	Percentage (%)
N323	The application of statistical concepts within the financial industry.	100