Course information 2018–19
ST2187 Business analytics, applied modelling and prediction

People in business, economics and the social sciences are increasingly aware of the need to be able to handle a range of mathematical and statistical models. It must be admitted that many good managers are not very mathematically adept. However, they would be even more inquisitive, more precise, more accurate in their statements, more selective in their use of data, more critical of advice given to them etc. if they had a better grasp of quantitative subjects. Modelling is an important tool which all good managers should appreciate. The course extends and reinforces existing knowledge and introduces new areas of interest and applications of modelling in the ever-widening field of management.

Prerequisite

If taken as part of a BSc degree, courses which must be passed before this course may be attempted:

ST104a Statistics 1 **and** eitherMT105a Mathematics 1 **or** MT1174 Calculus.

Exclusion

None

Aims and objectives

The objectives specifically include:
- the mechanics of building applied business models
- managerial decision making
- producing and critiquing forecasts.

Recommended reading

Albright, S., W. Winston and C.J. Zappe. *Data Analysis and Decision Making*, South-Western, fourth edition (2010) [ISBN 9780538476126].

Access to Microsoft Excel and Tableau.

Learning outcomes

At the end of the course and having completed the essential reading and activities students should be able to:

- ☑ apply modelling at varying levels to aid decision-making

- ☑ understand basic principles of how to analyse complex multivariate datasets with the aim of extracting the important message contained within the large amount of data which is often available

- ☑ demonstrate the wide applicability of mathematical models while, at the same time, identifying their limitations and possible misuse.

Assessment

This course is assessed by an individual case study piece of coursework (30%) and a two hour unseen written examination (70%).

Syllabus
This is a description of the material to be examined, as published in the *Regulations*. On registration, students will receive a detailed subject guide which provides a framework for covering the topics in the syllabus and directions to the essential reading

Chapter 1: Introduction to data analysis and decision-making under uncertainty

The course begins with a high-level overview of the statistical analysis of data, and the challenges businesses face in their decision-making in an uncertain world. Aspects of data management and the preparation of data for analysis are discussed, along with a review of descriptive statistics.

Chapter 2: Exploring relationships between variables and applied statistical inference

Associations between variables involving categorical and/or measurable variables, including pivot tables. Empirical applications of confidence interval estimation and hypothesis testing.

Chapter 3: Data visualisation with Tableau

An introduction to Tableau, a popular software tool for data visualisation and business intelligence, and understanding the principles of creating and evaluating effective data visualisations using dynamic in-time charts, generating reports using dashboards, and extracting insight using storytelling.

Chapter 4: Probability distributions and decision making under uncertainty

A selection of important probability distributions used in applied modelling. Decisions trees and risk profiles are used to model decision making under uncertainty.

Chapter 5: Regression analysis

Aspects of building multiple linear regression models, including dummy variables, interactions, nonlinear transformations, model selection criteria and prediction.

Chapter 6: Time series analysis and forecasting

Time series data are considered, with a focus on trend and seasonality components. Forecasting models, such as exponential smoothing, are developed and evaluated, including implementation in Tableau.

Chapter 7: Linear programming

Constrained optimisation models using Microsoft Excel's *Solver*, including the interpretation of sensitivity analysis reports.

Chapter 8: Monte Carlo simulation

The principles of Monte Carlo simulation are introduced, including a summary of different probability distributions. Applied simulation examples conclude.

Course convenor: Dr James Abdey.

Course will be added to selection group N.