Liverpool John Moores University

Title:	DATA EXPLORATION AND ANALYSIS
Status:	Definitive
Code:	**4000STATS** (103319)
Version Start Date:	01-08-2016
Owning School/Faculty:	Applied Mathematics
Teaching School/Faculty:	Applied Mathematics

Team	Leader
Ian Jarman	Y

Academic Level:	FHEQ4	**Credit Value:**	24	**Total Delivered Hours:**	74
Total Learning Hours:	240	**Private Study:**	166		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	24
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Practice	AS1	Extensive analysis using Minitab	25	
Test	AS2	In-class open book test	25	1
Exam	AS3	Examination	50	2

Aims

To enable the student to carry out an exploratory analysis of a set of data either 'by hand' or using Minitab.
To provide the student with the required background knowledge of probability and random variables so that they can make use of a number of formal statistical models in their analyses.

To enable the student to appreciate the need for, and use of, confidence intervals in a number of commonly occurring data analysis situations.
To enable the student to appreciate the need for, and use, hypothesis tests in a number of commonly occurring data analysis situations.

Learning Outcomes

After completing the module the student should be able to:

1 Carry out an exploratory numerical and graphical analysis of a set of data by hand and/or using Minitab.
2 Demonstrate the ability to calculate and estimate probabilities.
3 Calculate confidence intervals for parameters of a number of probability models used in data analysis.
4 Construct and carry out hypothesis tests upon the parameters of a number of probability models used in data analysis.
5 Use Minitab for the above inferential analyses.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Analysis using Minitab	1	5
In-class test	2	3
Exam	4	

Outline Syllabus

Data and tabular display.
Graphical displays – pie charts, histograms, stem-and-leaf plots, box plots, scatter diagrams.
Sample summary statistics – mean, median, mode, quartiles, interquartile range, standard deviation, variance.
Exploratory data analysis using Minitab.
Samples and populations.
Probability – definitions, addition rule, multiplication rule, independent events, conditional probability.
Random variables – discrete and continuous.
Expectation of a random variable, population parameters.
Probability distributions – discrete uniform, Bernouilli, Binomial, Poisson, continuous uniform, Normal. Normal probability plots.
Sampling distribution of the mean, central limit effect, Normal approximations. Linear combinations of random variables.
Confidence intervals – the mean of a Normal population: one sample and two sample cases, population proportions: one sample and two sample cases, large sample methods, small sample methods, the t-distribution, Minitab.

Hypothesis testing - the mean of a Normal population: one sample and two sample cases, population proportions: one sample and two sample cases, large sample methods, small sample methods, testing equality of variances, the F- distribution, Minitab.
The students will also meet SAS and SPSS during the course.
The examples used in the module will be drawn from a wide variety of subject areas (including business, science, technology, economics and the social sciences).

Learning Activities

Lectures, tutorials, laboratory sessions, directed reading, simulation, in-class open-book test (1), coursework (1) preparation, revision for examinations.

Notes

This module covers the exploratory analysis of data sets, the use of probability to handle uncertainty and develops the techniques of hypotheses testing and confidence interval construction.