

Liverpool John Moores University

Title: STATISTICAL MODELLING
Status: Definitive
Code: **5001STATS** (103325)
Version Start Date: 01-08-2018

Owning School/Faculty: Applied Mathematics
Teaching School/Faculty: Applied Mathematics

Team	Leader
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Academic Level: FHEQ5 **Credit Value:** 24 **Total Delivered Hours:** 75
Total Learning Hours: 240 **Private Study:** 165

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
Report	AS1	Report on the exploration of linear models using statistical software, e.g. MINITAB	12	
Report	AS2	Report on the analysis of data arising from an experimental situation using statistical software, e.g. MINITAB	13	
Exam	AS3	Examination	75	3

Aims

To enable the students to understand and use simple and multiple linear regression models.

To enable the students to understand and use one-way and two-way Analysis of Variance models.

To give the students an overview of the statistical modelling process.

To extend the students' knowledge and understanding of linear statistical models.

To introduce the students to basic ideas of experimental design.

To give the students experience of using statistical models in practice.

Learning Outcomes

After completing the module the student should be able to:

- 1 Use simple and multiple linear regression models.
- 2 Use one-way and two-way Analysis of Variance models.
- 3 Explore linear models using statistical software, e.g. MINITAB.
- 4 Use blocking techniques to reduce residual variation.
- 5 Use appropriately Latin Square and factorial designs.
- 6 Analyse data arising from an experimental situation using statistical software, e.g. MINITAB.

Learning Outcomes of Assessments

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

Linear models	3				
Data analysis	6				
Examination	1	2	4	5	

Outline Syllabus

Simple linear regression - ordinary least squares estimation, properties of least squares estimates, the analysis of variance, confidence intervals and tests, residuals, prediction.

Statistical software, e.g. MINITAB, for simple linear regression.

Multiple linear regression - adding a predictor to a simple regression model, regression in matrix notation, the analysis of variance, general F testing, model selection, residuals, prediction.

Statistical software, e.g. MINITAB, for multiple linear regression.

One-way Analysis of Variance - least squares estimation, subsidiary analyses.

Two-way Analysis of Variance - additive model, model with interaction effects, subsidiary analyses.

Statistical software, e.g. MINITAB, for one and two-way Analysis of Variance.

Examples from business, science and the social sciences.

Overview of the statistical modelling process.

Regression diagnostics - residuals, outliers, influence of cases, use of scatter plots, non-constant variance, non linearity.

Transformations.

Generalized Linear Models.

Model building - polynomial regression, comparing regression lines, variable selection.

Sources of variation - randomised blocks experimental designs.

Learning Activities

Lectures, tutorials and computing sessions.

Notes

This model covers simple and multiple linear regression, basic one and two-way Analysis of Variance models, and the process of statistical modelling.