

# Multivariate Analysis and Time Series

## Module Information

2022.01, Approved

### Summary Information

Module Code	6109STATS
Formal Module Title	Multivariate Analysis and Time Series
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

### Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

### Learning Methods

Learning Method Type	Hours
Lecture	33
Practical	22

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

### Aims and Outcomes

Aims	To enable the student to explore the structure of multidimensional data sets. To introduce the student to inferential procedures using multivariate data. To enable the student to explore the structure of data in the form of a time series, and make forecasts of future observations that will arise in the time series.
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**After completing the module the student should be able to:**

**Learning Outcomes**

Code	Number	Description
MLO1	1	Perform exploratory numerical and graphical analysis of a multivariate dataset and time series of data using appropriate statistical software.
MLO2	2	Evaluate situations in which a multivariate approach is required and conduct appropriate inferential procedures.
MLO3	3	Construct probability models for time series and use them to obtain forecasts and prediction intervals for time series data.
MLO4	4	Synthesise smoothing based methods to obtain forecasts and prediction intervals for a time series of data.
MLO5	5	Present statistical arguments effectively using a variety of media.

**Module Content**

Outline Syllabus	1) Multivariate Analysis • Graphical display and numerical summary of multivariate data. Investigation of the dependence among variables. • Discrimination and prediction. Error rate estimation. • Hypothesis construction and testing. Use of simultaneous confidence intervals. Principal Components Analysis. • Use appropriate software for data exploration, visualisation, parameter estimation and significance testing. 2) Time Series • Smoothing methods. • Moving Averages, EWMA, Exponential Smoothing, Holt’s method, the Holt-Winters method (with both additive and multiplicative seasonality). • Box-Jenkins method. • Identification, estimation and diagnostic checking of potential models, point and interval forecasts.
Module Overview	
Additional Information	This final year module advances beyond univariate statistical methods to the analysis of data sets with multiple dependent variables (multivariate data). A time series is a set of observations made sequentially through time, with the special feature that successive observations are not usually independent. The extent to which this can be both a boon and a hindrance will be discussed.

**Assessments**

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Portfolio	Portfolio	50	0	MLO1, MLO3, MLO4, MLO5
Centralised Exam	Examination	50	2	MLO2, MLO3, MLO4, MLO5

**Module Contacts**