

## MODULE DESCRIPTOR

<b>MODULE TITLE</b>	COMPUTATIONAL STATISTICS AND DATA ANALYSIS		
<b>MODULE CODE</b>	MA3872 (L6)	<b>CREDIT VALUE</b>	20 CREDITS (10 ECTS)
<b>CAMPUS</b>	UCLAN CYPRUS		
<b>SCHOOL</b>	SCHOOL OF SCIENCE		

### MODULE AIMS

This module aims to develop students' knowledge of computational approaches to solving statistical problems, and further develop students' skills in data manipulation, including how to write efficient and transparent programs in R, and introducing them to packages and functions that are used in statistical analysis as well as techniques for managing data and using graphs to visually describe datasets.

### MODULE CONTENT

**Data Structure and Data Types:** Vectors, Matrices, Arrays, Lists, Numeric, Logical, Character.

**Mathematical Calculations in R:** Numbers, Vectors, Matrices, Random Numbers.

**Basic Graphics:** High-level plots, Low-level plots and the layout command par.

**Programming:** Logical and Comparison Operators, Functions.

**Simulations:** Asymptotic Theory, Monte Carlo simulations.

**Statistical Inference:** Descriptive Statistics, Statistical Inference for one and two samples, test of goodness of fit, Contingency Tables.

#### Linear Regression

**Analysis of Variance:** One-Way ANOVA, Multiple-Factor ANOVA.

**Logistic Regression:** Logistic Model, Probit Model.

**Resampling Techniques:** Jackknife Method, Bootstrap Method.

#### Analysis of Covariance

#### Estimation of Non-Linear Models

**Non-Parametric Regression:** Local Polynomial Regression, Smoothing Splines, Additive Nonparametric Regression.

**Survival Analysis:** Survival Function, Risk Function, Modeling Survival Data: Cox Proportional Hazards model.

#### Timeseries Analysis

## INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:	
1.	Critically discuss data
2.	Perform basic descriptive, exploratory and confirmatory data analysis.
3.	Identify appropriate modelling concepts based on the characteristics of the data.
4.	Write efficient and transparent programs in R.
5.	Discuss the results obtained from their analyses

## TEACHING METHODS

The class contact will consist of teaching classes together with workshops. Teaching classes will introduce new material and provide examples. Tutorials have no new material introduced. Students will attempt problems during the tutorials. Key elements of the learning strategy are regular sessions during which problems are attempted. Throughout the week students will be given a list of problems to attempt.

The module will be assessed principally by examination. However to facilitate and monitor the formative learning process selected set exercises will be submitted for assessment. These will present regular opportunities for feedback and feedforward. At the end of the module, students will be expected to include a reflective component in this portfolio of work. This will make up the coursework component of the module.

## ASSESSMENT METHODS

The module is assessed through a Portfolio of selected questions from computing worksheets and a Project (written report and viva).