

MODULE DESCRIPTOR

MODULE TITLE	TIME SERIES		
MODULE CODE	MA3873 (L6)	CREDIT VALUE	20 CREDITS (10 ECTS)
CAMPUS	UCLAN CYPRUS		
SCHOOL	SCHOOL OF SCIENCE		

MODULE AIMS

This module aims to introduce students to a variety of statistical models for time series and cover the main methods for analysing these models.

MODULE CONTENT

Models for time series: Time series data, Trend, Seasonality, Cycles and Residuals, Stationary processes, Autoregressive processes (AR), Moving average processes (MA).

Models of stationary processes: Purely indeterministic processes, ARMA processes, ARIMA processes, Estimation of the autocovariance function, Identifying an MA(q) process, Identifying an AR(p) process.

Spectral methods: The discrete Fourier transform, The spectral density, Analysing the effects of smoothing.

Estimation of the spectrum: The periodogram, Distribution of spectral estimates, The fast Fourier transform.

Linear filters: The Filter Theorem, Application to autoregressive processes, Application to moving average processes, The general linear process, Filters and ARMA processes, Calculating autocovariances in ARMA models.

Estimation of trend and seasonality: Moving averages, Centred moving averages, The Slutsky-Yule effect, Exponential smoothing, Calculation of seasonal indices.

Fitting ARIMA models: The Box-Jenkins procedure, Identification, Estimation Verification, Tests for white noise, Forecasting with ARMA models.

State space models: Models with unobserved states, The Kalman filter, Prediction, Parameter estimation revisited.

INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:	
1.	Apply the standard techniques of time series analysis
2.	State the definitions of weak and strict stationarity, autocovariance and autocorrelation functions, for stationary time series models
3.	Use autoregressive (AR), moving average (MA) and ARMA models, and evaluate their properties.
4.	Apply the parameter estimation methods for ARMA models
5.	Distinguish the procedures between different forecasting techniques and identify the best method or model for producing forecasts

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 set exercises and a Written examination.