F71DA Data Analytics and Time Series Analysis

COURSE DETAILS
Course Code: F71DA
Full Course Title: Data Analytics and Time Series Analysis
SCQF Level: 11
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: No
Postgraduate Taught: Yes
Postgraduate Research: No

Additional Information:

COURSE AIMS

This course aims to provide a good understanding of the concepts and methods used in time series analysis and advanced techniques for data analytics.

LEARNING OUTCOMES – SUBJECT MASTERY

On completion of this course the student should be able to:

- demonstrate knowledge of, and a critical understanding of, the main concepts of time series analysis
- demonstrate knowledge of, and a critical understanding of, the main properties of MA, AR, ARMA, ARIMA, and RW models
- use least squares, maximum likelihood and other methods to fit time series models to the data
- select proper model(s) using e.g. AIC or BIC
- fit trend and seasonal trend to the data, and fit time series models to the residuals
- understand methods used to produce forecasts
- understand ARCH, GARCH and other nonlinear time series models and their applications for modelling of financial data
- understand time series data well, and perform basic calculations and summaries of time series data
- understand and critically assess time series models fitted by computer packages
- use a range of time series models to produce forecasts
- understand the elementary principles of machine learning
- apply copulas to multivariate data
- understand the basic concepts of extreme value theory

LEARNING OUTCOMES – PERSONAL ABILITIES

At the end of the course student should be able to:
• Demonstrate the ability to learn independently
• Manage time, work to deadlines and prioritise workloads
• communicate meaningfully and productively with others (including practitioners and professionals in the financial services industry) on data analytics issues

Students should be able to

• use statistical software to fit time series models to data and
• analyse empirical data using modern data analytics techniques

SYLLABUS

• Basic time series concepts and operators
• Stationary processes, general linear filter, autocorrelation function and spectrum
• MA, AR and ARMA processes
• ARIMA processes and Random Walk (RW) with or without drift
• Model estimation and model selection
• Models with trend and/or seasonality
• Forecasting
• Introduction to nonlinear processes
• Elementary principles of machine learning
• Copulas
• Extreme value theory

COURSE RELATIONSHIPS

N/A

LOCATION AND ASSESSMENT METHODS

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