Course ID 029345

Statistical Modelling in Finance

MATH 48191

Credit rating 15
ECTS credits 7.5

Unit coordinator: Jingsong Yuan

Semester 1

School of Mathematics
Undergraduate ***Level 4***

FHEQ level ' Masters/Integrated Masters P4'

Marketing course unit overview
This course unit is set up to support the finance pathway of the BSc in Mathematics and Statistics. No previous knowledge of finance is required.

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Aims
Students should gain an insight into statistical models and methods to fit financial data and assess risk. As a result they should be able to analyse financial data using statistical methods.

Learning outcomes
On successful completion of the course, students will be able to analyse economic and financial data using statistical models. Emphasis will be placed on model fitting and interpretation.

Syllabus
- Characteristics of financial data. Mean, variance, skewness, kurtosis, heavy tails. [2]
- Distributions with Pareto tails. Maximum likelihood estimation and inference. [2]
- Correlation and dependence. Regression methods. [2]
- Asset returns. The random walk model. Market efficiency and tests. [3]
- Portfolio Theory. Risk versus expected return. The minimum variance portfolio. Efficient portfolios. [5]
- The Capital Asset Pricing Model. Estimation of Beta and testing of CAPM. Factor Models. [5]
- Value at risk. [3]
- Time series of asset returns. Stationarity. Estimation of variance and correlation. Tests of uncorrelatedness. Regression models with correlated errors. [3]
- State space models and Kalman filtering. Dynamic linear models and time-varying betas in CAPM. [4]

- Dynamic models of asset returns and volatility. [4]

Assessment methods
End of semester examination: three hours weighting 80% plus 20% coursework.

Feedback methods
Tutorials will provide an opportunity for students' work to be discussed and provide feedback on their understanding.

Requisites

MATH20701	Probability 2	Pre-Requisite	Compulsory
MATH20802	Statistical Methods	Pre-Requisite	Compulsory

Students are not permitted to take more than one of MATH38191 or MATH48191 for credit in the same or different undergraduate year. Students are not permitted to take MATH48191 and MATH68191 for credit in an undergraduate programme and then a postgraduate programme.

Available as free choice? N

Recommended reading
- Lai TL and H Xing (2008). Statistical Models and Methods for Financial Markets. Springer. Available at http://rylibweb.man.ac.uk/cgi-bin/doip.pl?10.1007+978-0-387-77827-3.
- Ruppert D (2004). Statistics and Finance: An Introduction. Springer.

Scheduled activity hours

Lectures	33
Tutorials	11

Independent study hours 106 hours

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