ST958-15 Advanced Trading Strategies

26/27

Department
Statistics
Level
Taught Postgraduate Level
Module leader
Miryana Grigorova
Credit value
15
Module duration
9 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Three topics will be covered each year, motivated by current questions relevant to the financial industry. Each topic will be presented by a different lecturer, who is an expert in the research area.

This module is available for students on a course where it is a listed option and as an Unusual Option to students who have the relevant pre-requisite knowledge as indicated in the prerequisite modules.

Pre-requisites:
Students on the MSc in Mathematical Finance: ST908: Stochastic Calculus for Finance
Students on Integrated Masters courses in Statistics or on the MSc in Statistics: ST401 Stochastic Methods in Finance

Module web page

Module aims

To provide an introduction to three advanced topics in Mathematical Finance.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Three topics will be covered each year, motivated by current questions relevant to the financial industry. Example topics are algorithmic trading, introduction to market microstructures, limit order books.

Algorithmic trading would cover topics such as electronic markets - market participants, order types, and the limit order book. Stochastic optimal control and stopping; the dynamic programming principle and HUB equation. Optimal execution models with temporary and permanent price impact, linear and non-linear impact. Optimal execution models with limit orders and market orders; fill probabilities. Market Making. Targeting volume, for example, VWAP schedules.

Introduction to market microstructures would cover topics such as: order flow and liquidity; inventory risk, trade size and market depth; measuring liquidity and price discovery; static limit order markets; dynamic limit order markets; high-frequency trading; trading strategies.

Limit order books would cover topics such as main statistical characteristics of LOB: the distribution of the time of arrivals, volumes, placement and cancellation of orders, the shape of LOB and the intraday seasonality, modelling in physical time and event-driven times. Agent-based models, microstructure of the double auction, zero-intelligence, econophysics approaches via reaction-diffusion and decomposition-evaporation processes. Markov models of LOB, diffusive limits, large-scale limits, queueing theory modelling, Hawkes processes, SDEs and PDEs modelling, game-theoretic modelling.

Learning outcomes

By the end of the module, students should be able to:

- Compute and explain key variables in the relevant models.
- Apply appropriate mathematical techniques.
- Analyse and compare different modelling approaches.

Indicative reading list

Reading lists can be found in Talis

Specific reading list for the module

Subject specific skills

TBC

Transferable skills

TBC

Study

Teaching split

Provider	Weighting
Statistics	67%
Warwick Business School	33%

Study time

Type	Required
Lectures	27 sessions of 1 hour (18%)
Private study	123 hours (82%)
Total	150 hours

Private study description

Weekly revision of lecture notes and materials, wider reading, practice exercises and preparing for examination.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D3

	Weighting	Study time	Eligible for self-certification
Class Test 1	5%		No
A class test taken during the term covering a range of material from the module.			
Class Test 3	5%		No
A class test taken during the term covering a range of material from the module.			
Class Test 2	5%		No
A class test taken during the term covering a range of material from the module.			

	Weighting	Study time	Eligible for self-certification
On-campus Examination	85%		No

The examination paper will contain a section of compulsory questions and a section of optional questions.

- Students may use a calculator
- Answerbook Pink (12 page)

Assessment group R2

	Weighting	Study time	Eligible for self-certification
Resit Examination	100%		No

Feedback on assessment

- Verbal qualitative feedback will be given after class tests.
- Written quantitative and qualitative feedback will be given after the final exam.
- Solutions will be provided for the examination paper. Examination scripts are retained for external examiners and will not be returned to students.

Past exam papers for ST958

Availability

Courses

This module is Optional for:

- Year 1 of TMAA-G1PF Postgraduate Taught Mathematics of Systems
- Year 1 of TSTA-G4P1 Postgraduate Taught Statistics
- Year 4 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics

This module is Option list A for:

- Year 1 of TSTA-G4P1 Postgraduate Taught Statistics
- Year 5 of USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated
- Year 4 of USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
- Year 5 of USTA-G1G4 Undergraduate Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)

This module is Option list B for:

- TSTA-G4P1 Postgraduate Taught Statistics
    - Year 1 of G40B Statistics with Data Science (Taught)
    - Year 1 of G40A Statistics with Probability (Taught)

This module is Option list D for:

- Year 5 of USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated

This module is Option list E for:

- Year 5 of USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated

This module is Option list F for:

- Year 4 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics