1. **Title of the module**

MAST6040 (MA6540) – Financial Econometrics

MAST7040 (MA7540) - Financial Econometrics

1. **School or partner institution which will be responsible for management of the module**

School of Mathematics, Statistics and Actuarial Science

1. **The level of the module (e.g. Level 4, Level 5, Level 6 or Level 7)**

MAST6040: Level 6; MAST7040: Level 7

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Spring

1. **Prerequisite and co-requisite modules**

**Level 6:**

Pre-requisites: MAST4009 Probability, MAST4011 Statistics, MAST5001 Applied Statistical Modelling and MAST5007 Mathematical Statistics

Co-requisite: None

**Level 7:**

Pre-requisites: Students are expected to have studied material equivalent to that covered in the modules above.

Co-requisites: None

1. **The programmes of study to which the module contributes**

For the level 6 module, BSc Financial Mathematics (including programme with a Year in Industry).

For the level 7 module, MSc Statistics with Finance (including programme with an Industrial Placement).

1. **The intended subject specific learning outcomes**

**On successfully completing the level 6 module students will be able to:**

1. demonstrate systematic understanding of key aspects of financial time series data analysis;
2. demonstrate the capability to deploy established approaches accurately to analyse and solve problems using a reasonable level of skill in calculation and manipulation of material in the following areas: ARIMA and GARCH model building, testing and estimation, model selection, forecasting, financial hypothesis testing and modelling in the context of asset returns, the efficient portfolio;
3. apply key aspects of financial time series data analysis in well-defined contexts, showing judgement in the selection and application of tools and techniques;
4. show judgement in the application of R.

**On successfully completing the level 7 module students will be able to:**

1. demonstrate systematic understanding of financial time series data analysis;
2. demonstrate the capability to solve complex problems using a very good level of skill in calculation and manipulation of the material in the following areas: ARIMA and GARCH model building, testing and estimation, model selection, forecasting, financial hypothesis testing and modelling in the context of asset returns, the efficient portfolio;
3. apply a range of concepts and principles in financial time series data analysis in loosely defined contexts, showing good judgement in the selection and application of tools and techniques;
4. make effective and well-considered use of R.
5. **The intended generic learning outcomes.**

**On successfully completing the level 6 module students will be able to:**

1. manage their own learning and make use of appropriate resources;
2. understand logical arguments, identifying the assumptions made and the conclusions drawn;
3. communicate straightforward arguments and conclusions reasonably accurately and clearly and communicate technical material competently;
4. manage their time and use their organisational skills to plan and implement efficient and effective modes of working;
5. solve problems relating to qualitative and quantitative information;
6. make competent use of information technology skills such as online resources (moodle);
7. communicate technical and non-technical material competently;
8. demonstrate an increased level of skill in numeracy and computation;
9. demonstrate the acquisition of the study skills needed for continuing professional development.

**On successfully completing the level 7 module students will be able to:**

1. work competently and independently, be aware of their own strengths and understand when help is needed;
2. demonstrate a high level of capability in developing and evaluating logical arguments;
3. communicate arguments confidently with the effective and accurate conveyance of conclusions;
4. manage their time and use their organisational skills to plan and implement efficient and effective modes of working;
5. solve problems relating to qualitative and quantitative information;
6. make effective use of information technology skills such as online resources (moodle);
7. communicate technical and non-technical material effectively;
8. demonstrate an increased level of skill in numeracy and computation;
9. demonstrate the acquisition of the study skills needed for continuing professional development;
10. **A synopsis of the curriculum**

Overview of statistical methods. Stationary time series. Autocovariance and autocorrelation functions. Partial autocorrelation functions. ARMA processes. ARIMA model building, testing and estimation. Criteria for choosing between models. Forecasting. Cointegration. Prediction bounds. Asset return and risk. Term structure of interest rates. Distributional properties of asset returns. Testing for CAPM. Testing random walk hypothesis and predicting asset return. Sharpe ratio and efficient portfolio. Cross-section modelling and GMM. Estimate multifactor models. Financial applications of AR, MA, and ARMA. ARCH and GARCH models. Volatility processes. Simple applications of these techniques using R.

In addition, level 7 students will study advanced applications of these techniques using R.

1. **Reading List (Indicative list, current at time of publication. Reading lists will be published annually**)

Enders, W. (2004). Applied Econometric Time Series. New York: Wiley.

Brockwell, P.J. & Davis, R.A. (2002). Introduction to Time Series and Forecasting. New York: Springer.

Ruey S. Tsay (2002). Analysis of financial time series, New York: Wiley

Campbell, J.Y., Lo, A.W. and Mackinlay, A.C. (1997). The Econometrics of Financial Markets, New Jersey: Princeton University Press.

Lyuu Y. (2002). Financial Engineering and Computation. Cambridge University Press.

1. **Learning and Teaching methods**

**Level 6 module:**

Total contact hours: 36

Private study hours: 114

Total study hours: 150

**Level 7 module:**

Total contact hours: 40

Private study hours: 110

Total study hours: 150

1. **Assessment methods**
	1. Main assessment methods

**Level 6 module:**

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Exercises, requiring on average between 10 and 15 hours to complete 10%

Examination 2 hours 80%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement on the module.

**Level 7 module:**

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 10%

Assessment 2 Exercises, requiring on average between 10 and 15 hours to complete 10%

Examination 2 hours 80%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement on the module.

13.2 Reassessment methods

Like-for-like

1. **Map of Module Learning Outcomes (sections 8 & 9) to Learning and Teaching Methods (section12) and methods of Assessment (section 13)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 6 Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 | 9.7 | 9.8 | 9.9 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures/Exercise classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| Terminal classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** | **x** | **x** | **x** |  |
| Revision classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Examination | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level 7 Module learning outcome** | 8.5 | 8.6 | 8.7 | 8.8 | 9.10 | 9.11 | 9.12 | 9.13 | 9.14 | 9.15 | 9.16 | 9.17 | 9.18 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures/Exercise classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| Terminal classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** | **x** | **x** | **x** |  |
| Revision classes | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  | **x** | **x** |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Examination | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered:** Canterbury
2. **Internationalisation**

This module covers key principles, theories and concepts of economics/finance that are used in a global environment. Mastery of the subject-specific learning outcomes, 8.1 to 8.8, will equip students to apply these principles, theories and concepts in a wide range of international contexts. The module team is drawn from the School of Mathematics, Statistics and Actuarial Science, which includes many members of staff with international experience of teaching, research collaboration and of working within the financial sector.

In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material.

Examples covering various international economic/financial frameworks are included in the module where appropriate.

The support SMSAS provides to its students is also internationally attuned given our international student body.

**FACULTIES SUPPORT OFFICE USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs( Q6&7 cover sheet) |
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