# STAT790

## Stochastic Finance

S2 Evening 2014

**Statistics**

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## General Information

<table>
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<tr>
<th>Unit convenor and teaching staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturer</td>
</tr>
<tr>
<td>Nino Kordzakhia</td>
</tr>
<tr>
<td><a href="mailto:nino.kordzakhia@mq.edu.au">nino.kordzakhia@mq.edu.au</a></td>
</tr>
<tr>
<td>E4A 537</td>
</tr>
<tr>
<td>Refer to iLearn</td>
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<table>
<thead>
<tr>
<th>Credit points</th>
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<tbody>
<tr>
<td>4</td>
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<table>
<thead>
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<th>Prerequisites</th>
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<td>Admission to MRes</td>
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<tr>
<th>Corequisites</th>
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<td>Co-badged status</td>
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<table>
<thead>
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<th>Unit description</th>
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<tr>
<td>This unit serves as an introduction to the modern financial theory of security markets, and, in particular, share prices and derivatives. It explains how the financial markets work using appropriate mathematical and statistical models and tools. The material provides essential skills to those conducting research in the finance and banking sectors.</td>
</tr>
</tbody>
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## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at [https://students.mq.edu.au/important-dates](https://students.mq.edu.au/important-dates)

## Learning Outcomes

1. Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
2. In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;
3. Have a basic understanding of the Markowitz portfolio optimisation theory and Capital Asset Pricing Model;
4. Understand assumptions and limitations of the statistical models deployed in market and credit risk management.
### Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>5%</td>
<td>Week 2</td>
</tr>
<tr>
<td>Assignment 1</td>
<td>15%</td>
<td>Week 6</td>
</tr>
<tr>
<td>Quiz 2</td>
<td>5%</td>
<td>Week 9</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>15%</td>
<td>Week 12</td>
</tr>
<tr>
<td>Final Examination</td>
<td>60%</td>
<td>Exam timetable</td>
</tr>
</tbody>
</table>

**Quiz 1**

**Due:** **Week 2**  
**Weighting:** **5%**  
Quiz 1 is open book online short test.

This Assessment Task relates to the following Learning Outcomes:

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;

**Assignment 1**

**Due:** **Week 6**  
**Weighting:** **15%**  
The assignment questions will be made available through iLearn.

This Assessment Task relates to the following Learning Outcomes:

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;

**Quiz 2**

**Due:** **Week 9**  
**Weighting:** **5%**  
Quiz 1 is open book online short test.
This Assessment Task relates to the following Learning Outcomes:

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;

Assignment 2
Due: Week 12
Weighting: 15%

The assignment questions will be made available through iLearn.

This Assessment Task relates to the following Learning Outcomes:

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;
- Have a basic understanding of the Markowitz portfolio optimisation theory and Capital Asset Pricing Model;

Final Examination
Due: Exam timetable
Weighting: 60%

A three-hour final examination for this unit will be held during the University Examination period.

You may take ONE hand-written A4 pages (written on one or both sides) of summary notes into the exam.

To be eligible for a passing grade in this unit, a pass is required in the final examination.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations.

http://exams.mq.edu.au/

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consult Disruption to Studies Policy


A supplementary examination will only be granted if a student has satisfactory coursework (i.e. e.
at least 50% of coursework).

The Macquarie university examination policy details, the principles and conduct of examinations at the University can be viewed at

http://www.mq.edu.au/policy/docs/examination/policy.htm

This Assessment Task relates to the following Learning Outcomes:

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;
- Have a basic understanding of the Markowitz portfolio optimisation theory and Capital Asset Pricing Model;
- Understand assumptions and limitations of the statistical models deployed in market and credit risk management.

**Delivery and Resources**

**TEXTBOOK**

There is not textbook for this unit.

**The list of recommended texts:**


**INTERNET RESOURCES / TECHNOLOGIES USED**

Lecture notes will be available on the iLearn site prior to the lecture.

Consult the unit iLearn page regularly: https://ilearn.mq.edu.au/login/MQ/

**SOFTWARE**

Matlab and R are the recommended software in this unit.
# Unit Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Week</th>
<th>Topic</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 August</td>
<td>1</td>
<td>Simple market models</td>
<td></td>
</tr>
<tr>
<td>11 August</td>
<td>2</td>
<td>Continuous-time models</td>
<td>Quiz 1</td>
</tr>
<tr>
<td>18 August</td>
<td>3</td>
<td>Continuous-time models cont.</td>
<td></td>
</tr>
<tr>
<td>25 August</td>
<td>4</td>
<td>Black-Scholes-Merton (BSM) model: No-arbitrage and risk-neutral pricing</td>
<td></td>
</tr>
<tr>
<td>1 September</td>
<td>5</td>
<td>BSM model: Option pricing</td>
<td></td>
</tr>
<tr>
<td>8 September</td>
<td>6</td>
<td>BSM model: Option pricing cont.</td>
<td>Assignment 1 is due</td>
</tr>
<tr>
<td>15 September</td>
<td>7</td>
<td>Financial engineering</td>
<td></td>
</tr>
<tr>
<td>22 September</td>
<td></td>
<td>Mid-session break</td>
<td></td>
</tr>
<tr>
<td>6 October</td>
<td></td>
<td>6/10 Labour Day – NSW Public Holiday</td>
<td></td>
</tr>
<tr>
<td>13 October</td>
<td>9</td>
<td>Portfolio optimization theory</td>
<td>Quiz 2</td>
</tr>
<tr>
<td>20 October</td>
<td>10</td>
<td>Portfolio optimization theory cont.</td>
<td></td>
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Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:


In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student_conduct/](https://students.mq.edu.au/support/student_conduct/)

Student Support

Macquarie University provides a range of support services for students. For details, visit [http://students.mq.edu.au/support/](http://students.mq.edu.au/support/)

Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.
Graduate Capabilities

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;
- Have a basic understanding of the Markowitz portfolio optimisation theory and Capital Asset Pricing Model;
- Understand assumptions and limitations of the statistical models deployed in market and credit risk management.

Assessment tasks

- Quiz 1
PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

**Learning outcomes**

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of financial derivatives;
- Have a basic understanding of the Markowitz portfolio optimisation theory and Capital Asset Pricing Model;
- Understand assumptions and limitations of the statistical models deployed in market and credit risk management.

**Assessment tasks**

- Quiz 1
- Assignment 1
- Quiz 2
- Assignment 2
- Final Examination

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

**Learning outcomes**

- Understand no arbitrage asset pricing principles in discrete- and continuous-time statistical models;
- In Black-Scholes-Merton model use no arbitrage asset pricing principle for pricing of
financial derivatives;
• Have a basic understanding of the Markowitz portfolio optimisation theory and Capital Asset Pricing Model;
• Understand assumptions and limitations of the statistical models deployed in market and credit risk management.

**Assessment tasks**

• Quiz 1
• Assignment 1
• Quiz 2
• Assignment 2
• Final Examination

**Changes from Previous Offering**

This year two online quizzes (worth 10%) will replace three short tests administered in class previously.

**Grading**

The Macquarie University grading policy can be found at [http://mq.edu.au/policy/docs/grading/policy.html](http://mq.edu.au/policy/docs/grading/policy.html)

Note that, in order to be awarded a particular Standardised Numerical Grade (SNG) and Grade, a student must meet the performance standard outlined in the grading policy in both the coursework and the examination sections of the unit.

A Standardised Numerical Grade (SNG) gives you an indication of how you have performed within the band for your descriptive grade. The SNG is not a mark, and you may not be able to work it out based on your raw examination and other assessment marks. Nor are you able to determine you are “one mark away” from a different grade.

**Changes since First Published**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>29/07/2014</td>
<td>Double numbering of learning outcomes has been fixed.</td>
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