# AFIN270

## Stochastic Methods in Applied Finance

**S1 Day 2017**

*Dept of Applied Finance and Actuarial Studies*

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## Disclaimer

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General Information

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Contact via Email
E4A 610
Tuesdays 11am–1pm during teaching weeks or by appointment

Angela Chow
angela.chow@mq.edu.au

Credit points
3

Prerequisites
15cp at 100 level or above including (AFIN100 or AFIN102 or ACST152) and (STAT150 or STAT170 or STAT171)

Corequisites

Co-badged status

Unit description
The applied finance discipline has become more reliant on quantitative analysis in recent years. Increasingly, models employed by practitioners and researchers are based on assumptions about the stochastic properties of financial variables and time series. This unit covers a variety of stochastic models for use in applied finance and includes extensive use of Excel spreadsheets. The topics include discrete and continuous probability distributions, extreme events, joint probability distributions, copulas, Bayesian analysis, regression models, time series models, and risk-neutral pricing.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at https://students.mq.edu.au/important-dates

Learning Outcomes
1. Use a range of probability distributions to model different financial variables
2. Assess the dependence between financial variables with suitable statistical tools
3. Apply regression models and time series models to various financial time series
4. Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
5. Perform mathematical computations on Excel spreadsheets for practical problems

**General Assessment Information**

It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment marks (not including the final exam mark) will not be addressed.

Assessment criteria for all assessment tasks will be provided on the unit iLearn site.

### Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
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<tr>
<td>Assessed Coursework</td>
<td>20%</td>
<td>No</td>
<td>Throughout</td>
</tr>
<tr>
<td>Class Test</td>
<td>20%</td>
<td>No</td>
<td>Week 7</td>
</tr>
<tr>
<td>Final Exam</td>
<td>60%</td>
<td>No</td>
<td>Exam Period</td>
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**Assessed Coursework**

**Due:** Throughout  
**Weighting:** 20%

Weekly questions should be attempted and the work will be collected in four (4) of the tutorials randomly throughout the semester, without prior notice. Marks will be granted for accuracy and clarity of the work submitted.

No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of zero (0) for the task, except for cases in which an application for disruption of studies is made and approved.

It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment marks (not including the final exam mark) will not be addressed.
Assessment criteria will be provided on the unit iLearn site.

This Assessment Task relates to the following Learning Outcomes:

• Use a range of probability distributions to model different financial variables
• Assess the dependence between financial variables with suitable statistical tools
• Apply regression models and time series models to various financial time series
• Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
• Perform mathematical computations on Excel spreadsheets for practical problems

Class Test

Due: Week 7
Weighting: 20%

The class test covers the Excel applications in Week 1 to Week 6. Students will have one (1) hour to complete the test and submit their spreadsheets. Use of the Internet during the test is not permitted. Marks will be granted for accuracy and clarity of the work submitted. The class test will be conducted in the tutorial.

You are permitted one (1) A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the class test.

Students who do not attend the class test will be awarded a mark of zero (0) for the test, except for cases in which an application for disruption of studies is made and approved.

It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment marks (not including the final exam mark) will not be addressed.

Assessment criteria will be provided on the unit iLearn site.

This Assessment Task relates to the following Learning Outcomes:

• Use a range of probability distributions to model different financial variables
• Assess the dependence between financial variables with suitable statistical tools
Final Exam
Due: Exam Period
Weighting: 60%

A three-hour (3) written exam will be held during the normal university exam period. Questions will cover the entire unit. Marks will be granted for accuracy and clarity of the work shown.

You are permitted one (1) A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the final exam. Non-programmable calculators with no text-retrieval capacity are permitted.

Students who do not attend the final exam will be awarded a mark of zero (0) for the exam, except for cases in which an application for disruption of studies is made and approved.

This Assessment Task relates to the following Learning Outcomes:
- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
- Perform mathematical computations on Excel spreadsheets for practical problems

Delivery and Resources
The timetables for classes can be found on the University website at:
https://timetables.mq.edu.au/2017/

Tutorials (Excel workshops) will commence in Week 1.

The required textbook is:

Lecture handouts are available for download from iLearn before lectures. Students are expected to read the handout and the corresponding textbook chapter(s) before each lecture.
Students will be required to use iLearn, Excel, PDF, Word, BUGS, and a non-programmable calculator.

**Unit Schedule**

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<th>Measures of Location and Spread</th>
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<td>Week 2</td>
<td>Discrete Probability Distributions</td>
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<td>Week 3</td>
<td>Basic Option Pricing Techniques</td>
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<td>Week 4</td>
<td>Continuous Probability Distributions</td>
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<td>Week 5</td>
<td>Modelling Extreme Events</td>
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<td>Week 6</td>
<td>Joint Probability Distributions</td>
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<td>Week 7</td>
<td>Copulas and Dependence Measures</td>
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<td>Week 8</td>
<td>Bayesian Analysis</td>
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<td>Week 9</td>
<td>Regression Models</td>
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<td>Week 10</td>
<td>Time Series Models</td>
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<td>Week 11</td>
<td>Risk-Neutral Pricing</td>
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<td>Week 12</td>
<td>Professional Ethics</td>
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<td>Week 13</td>
<td>Revision</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/

Results

Results shown in iLearn, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Supplementary exams

Information regarding supplementary exams, including dates, is available at:

http://www.businessandeconomics.mq.edu.au/current_students/undergraduate/how_do_i/special_consideration

Student Support

Macquarie University provides a range of support services for students. For details, visit students.mq.edu.au/support/

Learning Skills

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

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Enquiry Service

For all student enquiries, visit Student Connect at ask.mq.edu.au

Equity Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.
Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

**Learning outcome**
- Perform mathematical computations on Excel spreadsheets for practical problems

**Assessment task**
- Class Test

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

**Learning outcomes**
- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
- Perform mathematical computations on Excel spreadsheets for practical problems

**Assessment tasks**
- Assessed Coursework
- Class Test
- Final Exam

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific
knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

**Learning outcomes**

- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
- Perform mathematical computations on Excel spreadsheets for practical problems

**Assessment tasks**

- Assessed Coursework
- Class Test
- Final Exam

**Critical, Analytical and Integrative Thinking**

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

**Learning outcomes**

- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
- Perform mathematical computations on Excel spreadsheets for practical problems

**Assessment tasks**

- Assessed Coursework
- Class Test
- Final Exam