



# AFIN2070

## Stochastic Methods in Applied Finance

Session 2, Online-scheduled-weekday 2022

*Department of Applied Finance*

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## General Information

Unit convenor and teaching staff

Unit Convenor

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Kai Li

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Credit points

10

Prerequisites

50cp at 1000 level or above including (AFIN100 or AFIN102 or AFIN1002 or ACST152 or ACST1052) and (STAT150 or STAT1250 or STAT170 or STAT1170 or STAT171 or STAT1171)

Corequisites

Co-badged status

Unit description

Quantitative modelling and analysis are significant components in the discipline of applied finance. The 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://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

**ULO1:** Use a range of probability distributions to model different financial variables.

**ULO2:** Assess the dependence between financial variables with suitable statistical tools.

**ULO3:** Apply regression models and time series models to various financial time series.

**ULO4:** Examine the concepts of no-arbitrage principle and risk-neutral pricing.

**ULO5:** Perform mathematical computations on Excel spreadsheets for practical problems.

## General Assessment Information

### Late Assessment Submission Penalty (written assessments)

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11.55pm. A 1-hour grace period is provided to students who experience a technical concern.

For any late submissions of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Online Quiz</a>	5%	No	Week 3
<a href="#">Mid Session Test</a>	20%	No	Week 8
<a href="#">Assignment</a>	15%	No	Week 10
<a href="#">Final Examination</a>	60%	No	University Examination Period

### Online Quiz

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 1 hours

Due: **Week 3**

Weighting: **5%**

The online quiz will be conducted through iLearn and consist of multiple choice questions, and calculation based questions, where a numerical value will need to be entered.

On successful completion you will be able to:

- Use a range of probability distributions to model different financial variables.

## Mid Session Test

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 12 hours

Due: **Week 8**

Weighting: **20%**

A practical test of 60 minutes will be held to give students practice on a summative task and to provide feedback on their progress midway through the session.

On successful completion you will be able to:

- 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.

## Assignment

Assessment Type <sup>1</sup>: Quantitative analysis task

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 10**

Weighting: **15%**

The assignment will cover quantitative analysis of the materials taught in the class.

On successful completion you will be able to:

- 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.
- Examine the concepts of no-arbitrage principle and risk-neutral pricing.

## Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **University Examination Period**

Weighting: **60%**

A two hour exam will be held during the University Examination Period.

On successful completion you will be able to:

- 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.
- Examine the concepts of no-arbitrage principle and risk-neutral pricing.
- Perform mathematical computations on Excel spreadsheets for practical problems.

<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

<p><b>Learning and Teaching Activities:</b></p>	<p>The content for each week will comprise of a lecture recording and a set of tutorial questions (Problem Sets).</p> <p><b>Lectures</b></p> <p>A lecture recording will be uploaded each week. Lecture notes will be available on iLearn.</p> <p><b>Tutorials</b></p> <p>Students will need to register to either an on-campus tutorial or an online (Zoom) tutorial. Tutorials are considered compulsory but no marks are allocated. Tutorials will be available for most, but not all weeks of the session. In weeks where there aren't any live (on-campus or online) tutorials, a recording will be provided to cover the relevant material.</p> <p>The tutorial schedule will be made available on iLearn.</p> <p>Tutorial enrolment or change of tutorial can be made through <i>eStudent</i> in the first two weeks of the session. <u>No tutorial changes are allowed after Week 2.</u> Students should attend their allocated tutorial, but exceptions may occur on a one-off basis. That is, where circumstances prevent you from attending your own tutorial in a given week, you may attend an alternative tutorial if room available.</p> <p>Students are expected to complete the '<i>Tutorial Questions</i>' as a self-directed study activity before attending a tutorial. Additional learning support will be available in tutor consultation times.</p> <p>The timetables for classes can be found on the University website at: <a href="https://timetables.mq.edu.au/2022/">https://timetables.mq.edu.au/2022/</a> (Excel workshops) will commence in Week 1.</p>
<p><b>Recommended Text:</b></p>	<p>Rachev S.T., Hoehstoetter M., Fabozzi F.J., and Focardi S.M., 2010, Probability and Statistics for Finance, John Wiley &amp; Sons.</p>
<p><b>Unit Web Page:</b></p>	<p>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.</p>
<p><b>Technology Used and Required:</b></p>	<p>Students will be required to use iLearn, Excel, PDF, Word, and a non-programmable calculator.</p>

## Unit Schedule

Week	Topic
Week 1	Measures of Location and Spread
Week 2	Discrete Probability Distributions
Week 3	Basic Option Pricing Techniques
Week 4	Continuous Probability Distributions
Week 5	Modelling Extreme Events
Week 6	Joint Probability Distributions
Week 7	Copulas and Dependence Measures
Week 8	Mid-term Exam
Week 9	Regression Models
Week 10	Time Series Models
Week 11	Risk-Neutral Pricing
Week 12	Professional Ethics
Week 13	Revision

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.s.mq.edu.au\)](https://policies.s.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

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

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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.