



# ECFS899

## Modelling Prices and Risk

AFC Term 4 CBD 2015

*Dept of Applied Finance and Actuarial Studies*

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#### **Disclaimer**

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## General Information

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Credit points

2

Prerequisites

(Admission to MAppFin or PGCertAppFin or GradDipAppFin) and ECFS867 and ECFS868

Corequisites

Co-badged status

Unit description

Quantitative modelling is an essential part of modern finance yet models are often misinterpreted and misused. The aim of this unit is to build an understanding of modelling techniques for prices in liquid markets (currencies, commodities, equities). We consider techniques for analysing the distribution of possible prices over both short and medium term horizons. Applications will therefore include the risk analysis of short-term trading and investment portfolios as well as future cash flows for a project (in non-financial corporations). Model risk is a focus of this unit, helping students to appreciate the deficiencies of all models, to make appropriate model selections and to consider the ethical dimensions of price and risk modelling. You will improve your modelling abilities and also your capacity to communicate and interpret complex technical information. Techniques include simulation analysis, mean reversion models, GARCH models (for changing volatility), analysis of correlation/co-movement and heavy-tailed distributions (for modelling extreme events). Case studies and computer workshops are used in class.

## 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:

Understand and apply quantitative and statistical methods crucial for market risk analysis.

Develop spreadsheet modelling skills.

Understand, apply and interpret quantitative risk models (including limitations thereof).

Deepen understanding of the drivers of market risk and market liquidity risk.

Develop skills in communicating complex technical concepts.

## General Assessment Information

### Grading Summary

To pass this unit (requires a Standardised Numerical Grade of 50 or better) the student must pass the final exam.

### Professional Risk Manager (PRM) Certification

A passing grade in this Unit is required for students to obtain exemptions in the PRM Certification. For further information about PRM certification please see:

<http://www.maafc.mq.edu.au/our-programs/prmia-certification-program/>

## Assessment Tasks

Name	Weighting	Due
<a href="#">Assignment</a>	50%	Refer to iLearn
<a href="#">Final Exam</a>	50%	Refer to Timetable

### Assignment

Due: **Refer to iLearn**

Weighting: **50%**

#### Summary of Assessment Task

**Individual / Group:** Individual

**Due Date:** Refer to the Unit's iLearn site

**Grading Method:** Refer to 'Standards Required to Complete the Unit Satisfactorily' section

**Submission Method:** Online via the Unit's iLearn site

**Duration:** Refer to Assignment Coversheet

**Extension Requests:**

- If you have extenuating circumstances that prevent you from submitting your assignment by the due date, please make arrangements with your Lecturer prior to the due date.
- Unless prior arrangements have been made, any late submission of assignments will automatically be penalised. In the absence of special circumstances, the penalty will be 10% of the available marks for the assessment for each business day (or part thereof) they are late.

**Other Information:**

- Assignment question will be distributed in class.
- Data for spreadsheet analysis will be placed on iLearn.

On successful completion you will be able to:

- Understand and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## Final Exam

Due: **Refer to Timetable**

Weighting: **50%**

**Summary of Assessment Task**

**Individual / Group:** Individual

**Due Date:** Refer to Timetable. Assessments: Different Class Groups have different deadlines. Students should find the timetable and dates relevant to their group at [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au)

**Grading Method:** Refer to 'Standards Required to Complete the Unit Satisfactorily' section

**Submission Method:** As per MAFC Program Rules & Procedures at [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au)

**Duration:** 2 hours plus 10 minutes reading time

**Examination Conditions:**

- All examinations are closed book. However, permitted materials and aids are:
  - A formula sheet to be provided by the Lecturer at the exam (see sample later in

Unit notes).

- Calculators. Permitted calculators are noted under 'Calculators' below.
- Exam times and locations are noted in the unit timetable at [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au).
- Refer to MAFC Program Rules & Procedures at [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au).

### **Extension Requests:**

- You are expected to present yourself for examination at the time and place designated in the relevant MAFC Timetable at [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au).
- Deferral of an examination is not permitted, unless special consideration has been approved by the Director of Studies under the University's Disruption to Studies Policy.
- Refer to MAFC Program Rules & Procedures at [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au) for information on the University's Disruption to Studies Policy or non-attendance at an examination.

On successful completion you will be able to:

- Understand and apply quantitative and statistical methods crucial for market risk analysis.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## **Delivery and Resources**

### **CLASSES**

**Face-to-Face Teaching:** Generally 20 hours

**Timetable:** Detailed timetable for classes are on the Centre's web site [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au)

### **Consultation Times:**

Students who wish to contact any of the teaching staff may do so through:

- The Unit's iLearn site, in relation to general queries (so that all students may benefit); or
- Individual consultation with the lecturer by email in the first instance, if necessary.

### **REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS**

**Text:** Nil

### **Additional Readings:**

- Additional readings are included in the unit notes or iLearn.
- Students should assume these readings are examinable unless otherwise advised.

**Lecture Notes:** Available in printed form and electronically via iLearn.

**Study Problems:** Students are required to work systematically through suggested problem sets. These problems will not be collected but they will help you prepare for the exams. Answers to the problems are posted on iLearn.

**Pre-Unit Materials:** Information papers on statistics, regression, accounting and other material may be found at <http://www.mafc.mq.edu.au/applications/minimum-knowledge-requirement/pre-course-materials1/>. Students should work through this material prior to commencing the degree. The material will remain a useful reference as students progress through the program.

### **Computer Workshop:**

- The aim is for no more than three students working at each computer in these workshops.
- Students with laptop computers are encouraged to bring them to class for use in computer workshops, provided that they have Microsoft Excel installed.
- Before classes commence students should carefully read the notice in your folder entitled “Computer Workshop Information”. This document explains how to download some Excel Add-ins that will be needed (if you do not already have them). There are also some files which you will need to obtain from iLearn. Please copy these onto your hard-drive before classes commence.

### **Extension References:**

- Alexander, Market Models: A Guide to Financial Data Analysis, Wiley 2002.

The book has 3 parts: volatility and correlation analysis, modelling the market risk of portfolios, and statistical models for financial markets. It is a useful reference for quantitative analysts in the field of risk modelling, and comes with a CD-rom containing examples of models described in the text. The book has a useful website: [www.wiley.co.uk/marketmodels](http://www.wiley.co.uk/marketmodels)

- Alexander and Sheedy (eds), The Professional Risk Manager’s Handbook.

This Handbook contains study materials for those planning to attain certification through the Professional Risk Managers’ International Association. It can be purchased online at [www.prmia.org](http://www.prmia.org). The chapters on linear algebra, numerical methods, VaR models (for market risk) are useful for this Unit.

- Alexander, Market Risk Analysis, Wiley 2008.

Carol Alexander’s magnum opus! Volume I “Quantitative Methods in Finance” has chapters on linear algebra, probability and statistics, numerical methods, and basic calculus. Volume II “Practical Financial Econometrics” has chapters on GARCH modelling, principal component analysis etc. Volume III “Pricing, Hedging and Trading Financial Instruments” includes coverage of portfolio mapping and volatility modelling. Volume IV “Value-at-Risk Models” deals with historical simulation, Monte Carlo simulation, stress testing etc.

- Brooks, Introductory Econometrics for Finance, Cambridge University Press, 2008 (2nd Edition).

This book has excellent coverage of GARCH, simulation methods and a review of fundamental mathematical and statistical concepts. Also good discussion of software packages for econometric analysis in Chapter 1. Available as an eBook.

- Christoffersen, Elements of Financial Risk Management, Academic Press, 2003.

Very readable book with chapters on volatility modelling, simulation methods, backtesting and stress testing. Has accompanying CD-rom with Excel spreadsheets.

- Dowd, Measuring Market Risk, Wiley 2004 (2nd Edition).

Covers both parametric and non-parametric methods for measuring risk, simulation methods, liquidity risk, backtesting, stress testing, model risk etc. Also has comprehensive technical appendices covering many technical issues such as extreme value theory, GARCH, copulas, principal component analysis etc. Comes with a CD with Excel workbooks and a collection of Matlab risk measurement functions.

- Hull, Options, Futures, and Other Derivatives, Pearson Education, 6th Edition.

A classic. Relevant chapters/sections for this Unit are on Monte Carlo simulation, Value-at-Risk, Estimating volatilities and correlations.

- Hull, Risk Management and Financial Institutions, Pearson, 3rd Edition 2012.

A book with readable material on many of the topics covered in this Unit e.g. GARCH models, VaR, decomposition of risk, back testing, stress testing, historical simulation, extreme value theory, Monte Carlo simulation, model risk and liquidity risk.

- J.P. Morgan/Reuters RiskMetrics – Technical Document (also known as RiskMetrics Classic), 1996, 4th Edition, available at [www.riskmetrics.com](http://www.riskmetrics.com).

This free document, downloadable from the web, is a 284 page book full of useful information on risk modelling. You can download it in sections if you prefer. While it contains some mathematical notation that may be offputting, it is a valuable resource for Students in this Unit.

- Mina and Xiao, Return to RiskMetrics: The Evolution of a Standard, [www.riskmetrics.com](http://www.riskmetrics.com) 2001.

This free document, downloadable from the web, is an update and restatement of the mathematical models in the 1996 RiskMetrics Technical Documents, now known as RiskMetrics Classic. It reflects numerous modelling and technological advances that have become widespread in industry since 1996; and a commitment to transparency in modelling risk. While it contains some mathematical notation that may be offputting, it is a valuable resource for Students in this Unit.

### **Calculators:**

- A financial calculator that can handle time value of money calculations, logs and power functions is required.
- The Hewlett Packard calculator hp17bII+ is recommended.
- In examinations, one of the following calculators are permitted:
  - Hewlett Packard hp17bII+
  - Hewlett Packard hp12c platinum or hp12c
  - Texas Instruments BAII PLUS (also the PROFESSIONAL version).
- No other calculators, mobile phones or computers are permitted in examinations.
- Please obtain and become familiar with one of these calculators before classes commence.

**Assumed Knowledge:** Mathematical content

- Finance has a high level of numerate content.
- This Unit covers statistical concepts and includes some matrix algebra. However the course is not for mathematicians but rather for those who need to interpret quantitative information. Calculations are not the focus of attention.
- The mathematical difficulty of this unit is not significantly greater than in Financial Risk Management.

**Assumed Access:**

- Access to a computer with word processing and spreadsheet capability is assumed, as is general student computer literacy.

## **TECHNOLOGY USED AND REQUIRED**

**Unit iLearn Site:**

- Found by logging on to iLearn [ilearn.mq.edu.au](http://ilearn.mq.edu.au), then clicking on ***ECFS899 Modelling Prices and Risk***.
- This is where you will find forums, downloadable resources and links to important pages.
- The forum allows you to communicate with other students and lecturer(s) and may provide supplementary material.
- You are requested to post your questions on the forums at least 24 hours prior to the assignment submission date or the examination date. Questions posted after that time may not be answered. **Please try to not leave your questions to the last few days.**

**Important Notice:**

- It is important that you familiarize yourself with the Unit's iLearn site.



- Students should check the Unit's iLearn site regularly (minimum twice a week and prior to all lectures) and look for updates and distribution of materials (including case studies) related to the unit or assessments and, if relevant, participate in forum discussions.

## **Unit Schedule**

### **1. INTRODUCTION**

#### **Topics:**

- Review of concepts from core Units
- Industry trends in modeling prices/risk (including regulatory trends)
- Why bother with quantitative risk modeling?
- What makes a good price/risk analyst?
- Ethical considerations in quantitative modelling

### **2. WORKING WITH HEAVY-TAILED DATA**

#### **Topics:**

- Testing for normality (review of hypothesis testing approach)
- The Student's  $t$  distribution
- Analytical vs Simulation methods for estimating risk in trading portfolios
- Historical Simulation (aka bootstrapping without replacement, unconditional empirical method)
- Application: trading portfolios

### **3. MULTI-ASSET ANALYSIS**

#### **Topics:**

- Analysing portfolios with matrices
- Decomposing risk (incremental, marginal and component risk analysis)
- Simulating with multiple assets
- Mapping positions to risk factors
- Application: an international equity portfolio

### **4. ISSUES FOR COMMODITIES**

#### **Topics:**

- Relevant data for energy & commodities risk assessment – oil, power & gas prices, power & gas demand, temperature & wind speed
- Mean reverting processes

- Jump diffusion processes
- Optionality in commodity markets – gas storage, power plants, pipelines
- Application: Cashflow-at-Risk analysis for power generation & hedge portfolios

## **5. CHANGING VOLATILITY AND CORRELATION**

### **Topics:**

- Testing for independence
- Volatility clustering
- GARCH models and EWMA
- Asymmetry in Volatility
- Application: Estimating VaR and ES in currency and commodity portfolios
- Changing Correlation

## **6. ESTIMATING MODEL PARAMETERS**

### **Topics:**

- Review of classical linear regression model
- Maximum likelihood estimation (MLE) concept
- Numerical procedures for optimization
- Assessing models in-sample (significant parameters, LR test for nested models)
- Application: Estimating a volatility model (EWMA)

## **7. MODELLING A FORWARD CURVE (ONLY IF TIME PERMITS)**

### **Topics:**

- Seasonality in commodity forward curves
- Forward curve evolution
- Statistical analysis of the forward curve drivers
- Forward curve modeling vs spot price modeling
- Principal Components Analysis
- Single Factor and Multi Factor models of the forward curve
- Applications : gas storage valuation, calculating VaR

## **8. MODEL RISK**

### **Topics:**

- How does model risk relate to risk models?
- Principles for assessing models
- Backtesting and validation
- Pulling it all together

## Learning and Teaching Activities

### Strategy

The Master of Applied Finance degree adopts a deep teaching and learning strategy, in which Students acquire and retain knowledge and also are able to make sense of the issues and concepts and apply them in the “real world”. The degree relies heavily on student engagement and participation by: (a) Continuous learning throughout the semester. This is encouraged through a combination of students undertaking prescribed reading throughout the units and / or completion of practice problems, case studies, assignments, class presentations etc and interaction via forums in the unit’s iLearn site; and (b) Assessments, which enable the student to demonstrate his / her understanding of the learning objectives achieved through the continuous learning.

### Student Participation

Students participate in this unit by: (a) Attending lectures and participating in class discussion; (b) Before each class, completing the recommended readings of notes and text, and working systematically through suggested problem sets; (c) Interacting on the unit’s iLearn site; and (d) Completing all assessment tasks and exams. On average the unit will require students to complete, for every hour of class time, approximately 3 hours private study.

## 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:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

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/)

### 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](#).

Students should also consult the MAFC Program Rules & Procedures found at <http://www.mafc.mq.edu.au>

## Student Support

Macquarie University provides a range of support services for students. For details, visit <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.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student enquiry service (MAFC-specific)

For all student enquires, please contact [studentsupport@mafc.mq.edu.au](mailto:studentsupport@mafc.mq.edu.au)

## Student Services and 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.

## Learning Skills

Learning Skills ([http://www.students.mq.edu.au/support/learning\\_skills/](http://www.students.mq.edu.au/support/learning_skills/)) 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 Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/hel>

p/.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

#### Learning outcomes

- Understand and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

#### Assessment tasks

- Assignment
- Final Exam

### 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 and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## Assessment tasks

- Assignment
- Final Exam

## 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 and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## Assessment tasks

- Assignment
- Final Exam

## 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 and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## Assessment tasks

- Assignment
- Final Exam

## PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

## Learning outcomes

- Understand and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## Assessment tasks

- Assignment
- Final Exam

## PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

## Learning outcomes

- Understand and apply quantitative and statistical methods crucial for market risk analysis.
- Develop spreadsheet modelling skills.
- Understand, apply and interpret quantitative risk models (including limitations thereof).
- Deepen understanding of the drivers of market risk and market liquidity risk.
- Develop skills in communicating complex technical concepts.

## Assessment tasks

- Assignment
- Final Exam

## Changes from Previous Offering

- The academic policies section of the unit guide was updated in March 2014.
- The Extension Requests section of this Unit Guide was updated in June 2014.

## Important Notice

This Unit Guide may be subject to change. The latest version is on the Centre's web site [www.mafc.mq.edu.au](http://www.mafc.mq.edu.au).

Students should read the Unit Guide carefully at the start of semester. It contains important information about the Unit. If anything is unclear, please consult one of the unit lecturers.

## Standards Required to Complete the Unit Satisfactorily

### University Policy on Grading:

- Macquarie University's Academic Senate has established a Grading Policy available at <http://www.mq.edu.au/policy/docs/grading/policy.html>. Your final result will include:
  - A grade ranging from Fail to High Distinction; and
  - A Standardised Numerical Grade (SNG). A SNG is not a summation of the individual assessment components, but is allocated on the basis of the performance in all assessment items, providing the examination component is passed.
- It is important to note:
  - The Policy does not require that a minimum or maximum number of students are to be failed in any unit;
  - Grades will not be allocated to fit a predetermined distribution; and
  - The process of allocating SNGs does not change the rank order of marks among students who pass the unit.

### Specific Unit Grading:

- To pass this unit (ie requires a Standardised Numerical Grade of 50 or better), the student must pass the combined examinations component of the assessment.
- All final grades in the Applied Finance Centre are determined by a grading committee



and are not the sole responsibility of the unit convenor.

- The core criteria used to assess student work in this unit are:
  - Knowledge and understanding: Understanding key ideas, knowledge and use of concepts.
  - Application: Ability to apply theoretical ideas and frameworks in practice and in a critically reflective way.
  - Reasoning and analysis: Ability to analyse, use critical reasoning and principles to formulate a position, balancing theory and personal reflection.
  - Professional literacy and research: Understanding of professional factors (language and landscape) and ability to undertake appropriate research.
  - Communication and presentation: Ability to communicate and present effectively (written and oral, as relevant).
  - Use of mathematical and statistical ideas: Ability to use mathematical and statistical ideas, methods and formulae appropriately.
- Performance in relation to each of these criteria are assessed against the University’s grading descriptors:

Grade	Expectation
High Distinction	Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the discipline.
Distinction	Provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.
Credit	Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the discipline.
Pass	Provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of study; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.
Fail	Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.

**Review of Grade and final examination Script viewing:**

- A student who has been awarded a final grade for a unit and who does not believe it is an accurate reflection of their performance, and has grounds for such a claim and can

demonstrate those grounds, may apply to have their grade reviewed.

- For information on requesting a review of grade and/or viewing your final exam script, please refer to the University's Grade Appeal Policy at <http://www.mq.edu.au/policy/docs/gradeappeal/policy.html> and MAFC Program Rules & Procedures at <http://www.mafc.mq.edu.au>.