



## **FIN201 Quantitative Applications in Finance**



# Subject outline

## FIN201 Quantitative Applications in Finance

- (1) Section 1 — General information
- (2) Section 2 — Academic details

### SECTION 1 — GENERAL INFORMATION

#### 1.1 Administrative details

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Duration	Credit points	Level
One study period (12 weeks)	6	AQF8

#### 1.2 Core or elective subject

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This is a core subject for the Master of Applied Finance.

#### 1.3 Delivery mode

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This subject is delivered online.

#### 1.4 Prerequisites

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There are no prerequisites for this subject. However please review the 'Assumed knowledge' section below to understand the prior knowledge Kaplan advises you should hold before enrolling in this subject.

#### 1.5 Assumed knowledge

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Whilst there are no prerequisites for this subject, Kaplan assumes that students have completed FIN101 Financial Markets and Economic Principles, FIN102 Regulation Ethics and Risk Management, and FIN103 Financial Analysis and Valuation, or understand the content covered in those subjects, prior to undertaking FIN201 Quantitative Applications in Finance.



## 1.6 Course transition subject equivalence

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Students are not required to complete this subject if they have transitioned from a SIA/Finsia/Kaplan course and have completed the following subjects within the course completion timeframe:

- FIN236 *Quantitative Applications in Finance*
- M01 *Quantitative Applications in Finance*.

## 1.7 Work integrated learning

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There are no placements, internships or work experience requirements associated with the undertaking of this subject.

## 1.8 Other resource requirements

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Students do not require access to specialist facilities and/or equipment to undertake this subject.



## SECTION 2 — ACADEMIC DETAILS

### 2.1 Subject overview

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This subject explores the underpinning quantitative skills required in today's financial markets. Using key data analysis and modelling techniques, students will interpret various types of financial information from the finance and investment industry, including treasury, investment management, corporate finance and investment analysis, in order to develop practical quantitative strategies. To achieve this, you will be required to read and critique articles published in key financial journals and validate the methodologies used and the conclusions reached. On completion of this subject, students will be equipped with a toolkit of statistical and quantitative techniques that can be used to interpret and forecast financial data.

### 2.2 Subject learning outcomes

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On successful completion of this subject, students should be able to:

1. Examine the various quantitative techniques used to describe, estimate and evaluate data
2. Evaluate the strengths and limitations of statistical analysis techniques in finance
3. Apply quantitative techniques to describe financial data and test claims of performance
4. Analyse the factors that influence the risk and return of asset classes and financial securities
5. Assess statistical models used in estimating the value of financial assets and constructing efficient portfolios

### 2.3 Topic learning outcomes

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#### Topic 1 — Fundamentals of quantitative applications

On successful completion of this topic, students should be able to:

- describe the importance of data and statistics in today's world of finance
- explain key concepts in statistics and probability
- calculate measures of central tendency
- calculate measures of dispersion
- calculate covariance and correlation between two random variables
- calculate expected value, variance and standard deviation for the sum of two random variables.

## Topic 2 — Probability distributions

On successful completion of this topic, students should be able to:

- explain probability distribution and distinguish discrete and continuous distribution
- interpret a probability function, a probability density function and a cumulative distribution function
- describe and interpret common discrete probability distributions such as the discrete uniform distribution and binomial distribution
- describe and interpret common continuous probability distributions such as the continuous uniform distribution, normal distribution and lognormal distribution
- calculate and interpret probabilities relating to a random variable given its probability distribution
- explain the key properties of the normal distribution and determine the probability that a normally distributed random variable lies inside a given interval
- define the standard normal distribution, explain how to standardise a random variable, and calculate and interpret probabilities using the standard normal distribution.

## Topic 3 — Sampling and estimation

On successful completion of this topic, students should be able to:

- define sampling techniques and the concept of sampling error and sampling distribution
- distinguish between point estimates and confidence intervals
- construct confidence intervals based on normal or student  $t$ -distributions.

## Topic 4 — Hypothesis testing

On successful completion of this topic, students should be able to:

- use hypothesis testing to evaluate population means, proportions and variances
- apply the principles of hypothesis testing in assessing the performance of investments
- recognise and apply ethical standards in hypothesis testing.

## Topic 5 — Correlation, covariance and causation

On successful completion of this topic, students should be able to:

- analyse the factors affecting financial instruments identifying which:
  - are significant
  - are positively or negatively interrelated
  - contribute to diversification
  - contribute to volatility
- apply the statistical analyses of covariance, correlation and matrix algebra
- explain the strengths and weaknesses of the Pearson and Spearman rank correlations
- calculate the variance of a portfolio of many asset returns using the covariance matrix of asset returns
- explain the difference between causation, correlation and spurious correlation.

## Topic 6 — Regression

On successful completion of this topic, students should be able to:

- predict the future value of financial data by carrying out regression analysis (using Microsoft Excel) using both simple and multiple regressions
- explain the strengths and weaknesses of regression analysis
- describe the estimation and hypothesis testing using regression models
- describe the methods for detecting and correcting violations of the simple linear regression model
- describe the methods of detecting factors affecting predictions.

## Topic 7 — Time-series analysis

On successful completion of this topic, students should be able to:

- discuss how time-series analysis is used in finance
- explain the different models used in time-series analysis
- determine which time-series model will produce superior forecasts in a particular circumstance.

## Topic 8 — Risk and return

On successful completion of this topic, students should be able to:

- analyse the risk and return of a portfolio using the chi-squared test
- describe the calculation of the Markowitz efficient frontier for investment
- explain the difference between diversifiable and systematic risk, and calculate the systematic risk (beta)
- assess investment manager/analyst skills using statistical analysis, including the use of a range of ratios
- describe the use of contribution analysis and performance attribution in identifying generators of value and analysing fund performance
- describe the use of benchmarks in measuring fund performance.

## Topic 9 — Asset pricing models

On successful completion of this topic, students should be able to:

- describe the methods of analysing risk using factor models
- explain the time-series approach of macroeconomic models
- explain the cross-sectional approach of fundamental models
- apply an illustrative multi-factor model to calculate a portfolio's total risk and tracking error
- describe the use of the CAPM to calculate market risk (beta)
- explain the difference between structural and statistical APT models of forecasting, and the different types of each model.

## Topic 10 — Optimisation and portfolio construction

On successful completion of this topic, students should be able to:

- describe the statistical techniques used in optimising the construction of a portfolio
- apply the mathematical program procedure in Microsoft Excel (Solver) to develop optimal portfolios with non-linear constraints
- describe the procedure for using genetic algorithms in combinatorial optimisation.

## 2.4 Assessment schedule

Assessment	Description	Week	Topics	Weighting	Subject learning outcomes assessed
Exam	Multiple-choice questions	Week 6	1–5	50%	LO1, 2, 3, 4
Assignment	Short-answer and excel based modelling questions	Week 12	All	50%	LO1–LO5

Please refer to our website [www.kaplanprofessional.edu.au](http://www.kaplanprofessional.edu.au) to review student policies relating to your assessment, including the *Kaplan Assessment Policy* and *Academic Integrity and Conduct Policy*.

## 2.5 Prescribed text

Berenson, ML, Levine, DM, Szabat, K, Stephan, DF, O'Brien, M, Watson, J & Jayne, N 2016, *Basic business statistics*, 4th edn, Pearson Australia, Frenchs Forest, NSW.

## 2.6 Study plan

Week(s)	Topic name	Study load in hours
1	Topic 1: Fundamentals of quantitative applications	7
2	Topic 2: Probability distributions	8
3	Topic 3: Sampling and estimation	10
4	Topic 4: Hypothesis testing	10
5	Topic 5: Correlation, covariance and causation	10
6	<b>Exam (Weighting 50%)</b> Topic 6: Regression	12
7	Topic 6: Regression (Continued)	10
8	Topic 7: Time-series analysis	10
9	Topic 8: Risk and return	10
10	Topic 9: Asset pricing models	10
11	Topic 10: Optimisation and portfolio construction	11
12	<b>Assignment (Weighting 50%)</b>	12
<b>Total minimum study load</b>		<b>120 hours</b>
Additional recommended personal study hours (may be required for concept review or additional research)		50 hours
<b>Total recommended study load</b>		<b>170 hours</b>