

### Maths and Statistics for the MFin Programme

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The Master of Finance is open to graduates of any discipline, so long as they can show a willingness to reach the necessary level of maths and statistics. There are plenty of people with degrees in the arts and humanities who have excelled and reached the highest positions in finance. Such people are often successful because they have a broad intellectual range. But finance is irreducibly somewhat mathematical and technical.

The guidelines below provide specific advice about the level of knowledge needed to complete the course.

#### Introduction

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Here we provide guidance on the maths, statistics and Excel spreadsheet skills you will need to cope with the Master of Finance course content. We specify:

1. a set of maths topics that you should have already covered before, and be able fairly quickly to refresh your memory of; if you find this material difficult or hard to remember then you are probably not going to find the course feasible;
2. an additional set of topics that you may not have covered before but which you will need to become familiar with ahead of starting the course; we provide specific example of book chapters that cover this material.
3. you should have a reasonably strong set of skills in using Excel (or any similar spreadsheet package); there are some specific topics which you should also have become familiar with before starting the course; we provide some exercises for successful applicants to help this process;

#### 1. Prerequisites for applying (mostly equivalent to UK Maths AS level)

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- Algebra: quadratic equations and their solutions; indices; simultaneous equations; inequalities.
- Functions, graphs and function sketching.
- Calculus: differentiation & integration; maxima & minima; second order conditions.
- Natural logs and exponential functions (ex).
- Statistics: descriptive statistics mean/median/mode and standard deviation; normal and binomial distribution; basic probability and expectation; sampling and estimation.
- Simple linear regression.

## 2. Additional topics to be covered before the course

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- Multivariate calculus, partial differentiation and Taylor series.
- Maxima and minima in multivariate calculus.
- Simple differential equations.
- Rules for means and variances of combinations of variables.
- Multiple regression and assumptions needed for estimates to be efficient and unbiased; t-statistics.
- Simple linear algebra (matrix multiplication and solution of simultaneous equations).

## 3. Excel topics

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In addition to basic skills: use of statistical functions (mean, median, mode, standard deviation, covariance, correlation); NPV and FV; random numbers; normal distribution; charts.

To be supplied to successful applicants.

Exercises in:

1. IRR, NPV analysis and simple DCF
2. Cost of capital, terminal value and data table for sensitivity analysis
3. Analysis of covariance and standard deviation of more than one asset
4. Mean-variance optimisation for three assets
5. Random number generation and lognormal modelling of stock prices.

## **Suggested Maths and Statistics books**

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There are very many books on mathematics and statistics that cover the material needed for the course (and a great deal more – it isn't necessary to study these books from cover to cover). A successful book should be accessible and give plenty of worked examples and exercises with answers for a student to work through. Most maths of this type is self-taught – you just have to practice.

A selection of maths books.

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- "Essential mathematics for economics and business" Second edition Teresa Bradley and Paul Patton (John Wiley)
- "Fundamental Methods of Mathematical Economics" Alpha Chiang (McGraw-Hill)
- "Schaum's Outline Mathematics for Economists" Edward Dowling (McGraw-Hill) (especially good on worked examples and exercises and much cheaper than many other books).

Harder maths books for those who want to cover more advanced material:

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- "Mathematics for Economists" Carl Simon & Lawrence Blume (Norton) Good but expensive.

- “Mathematics for Economists – An introductory textbook” Malcolm Pemberton & Nicholas Rau (Manchester University Press) Very good and available in reasonably priced paperback version.

#### Suggested statistics books

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There are dozens of books on applied statistics and on econometrics so these are just a guide.

- “Schaum’s Outline Statistics” Murray Spiegel et al (McGraw-Hill) covers the pure statistics well, but not the econometrics (mainly regression analysis) which is covered in:
- “Schaum’s Outline Statistics and Econometrics” Dominick Salvatore & Derrick Reagle (McGraw-Hill).

#### Excel and Financial Modelling

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- A very thorough book for those who want to really get into this subject is: “Financial Modelling” by Simon Benninga (MIT Press).