MSc Finance and MSc Finance and Private Equity

Pre-Sessional Course

Syllabus for Basic Prerequisites - Quantitative Methods

The main goal of this course is to present, in a very simple way, the key tools that will be used later in the Asset Markets course to analyze financial markets and assets. The tools covered here are universal and widely applicable. Being familiar with them will help you understand the main principles of finance better.

Topics

1. Basic Statistics and Econometrics Prerequisites
    - 1.1. Population Vs. Sample
    - 1.2. Random Variables
    - 1.3. Expected Value – Discrete Random Variables
    - 1.4. Sample Mean
    - 1.5. Population Variance and Standard Deviation of a Discrete Random Variable
    - 1.6. Sample Variance and Standard Deviation
    - 1.7. Population Mean, Variance and Standard Deviation of a Continuous R.V.
    - 1.8. Covariance and Correlation
    - 1.9. Covariance and Variance Rules
    - 1.10. Autocorrelation
    - 1.11. Risk-Return Trade-Off
    - 1.12. Normal Distribution
    - 1.13. From a Random Variable to a Random Sample
    - 1.14. Statistical Inference
    - 1.15. Estimators - Mean and Variance
    - 1.16. Hypothesis Testing
    - 1.17. T-tests
    - 1.18. Confidence Intervals
    - 1.19. Ordinary Least Squared (OLS) Regression
    - 1.20. R^2 – Goodness of Fit
    - 1.21. Hypothesis Testing in Simple Regression Analysis

2. Basic Stochastic Calculus Prerequisites
    - 2.1. Motivation
    - 2.2. Stochastic Processes
    - 2.3. Standard Brownian Motion (Wiener Process)
    - 2.4. Generalised (Arithmetic) Brownian Motion
    - 2.5. Geometric Brownian motion
    - 2.6. Ito Processes
    - 2.7. Taylor Series Expansion

2.8. Stochastic Multiplication Table

2.9. Ito's Lemma

3. Basic Precalculus Prerequisites
    3.1. Simultaneous Equations
    3.2. Time Value of Money
    3.3. Simple Interest Vs. Compound Interest
    3.4. Continuous Compounding
    3.5. Sequences and Series

4. Basic Calculus Prerequisites
    4.1. Differentiation – Summary of Rules
    4.2. Differentiation – Higher Order Derivatives
    4.3. Differentiation – Maximum and Minimum Points
    4.4. Differentiation – Partial Derivatives
    4.5. Taylor Series

Recommended Readings[1]

Basic Calculus Prerequisites

Any textbook that covers the basics of calculus will be sufficient[2].

Basic Statistics and Econometrics Prerequisites

Introduction to Econometrics by Christopher Dougherty, 5th Edition. Review chapter and chapters 1 to 3 only.

Slides for the textbook can be found on the following link:

http://global.oup.com/uk/orc/busecon/economics/dougherty5e/student/ppts/

Basic Stochastic Calculus Prerequisites

Options, Futures, and Other Derivatives by John C. Hull, 9th Edition. Chapter 14 only[3].

[1] Earlier editions of the recommended textbooks will also be sufficient. Note, chapter numbers may vary across different editions.
[2] The main emphasis should be on rules for differentiation, maximum and minimum points and Taylor series.
[3] Chapter entitled, "Wiener Processes and Ito's Lemma".