University of Padova
Master degree in Computational Finance

This document describes the prerequisites of mathematics, probability, statistics. We expect that all students admitted to the master program in Computational Finance possess a working knowledge of the following topics before the beginning of the lectures.

MATHEMATICS:

- Basic concepts: rational and real numbers, sets, functions, sequences
- Linear algebra: vectors, matrices, matrix operations, linear systems, solution techniques
- Limits of functions of a real variable
- Differential calculus for functions of real variables
- Integral calculus for functions of real variables
- Functions of several variables
- Basic concepts on differential equations (linear equations and separable variables)
- Basic concepts of free and constrained optimization

PROBABILITY:

- Basic concepts: sample space, outcomes, events, probability measure
- Conditional probability, Bayes' formula, independence of events
- Discrete and continuous random variables
- Probability distribution, cumulative distribution function, density function
- Expected value, variance, moments of a random variable
- Independence of random variables, covariance and correlation
- Distributions: normal (Gaussian) distribution, Student's t-distribution, F-distribution, Chi-square distribution
- Law of large numbers, central limit theorem

STATISTICS:

- Basic concepts of descriptive statistics
- Point estimation, confidence intervals, hypothesis testing
- The linear regression model