NITheCS

National Institute for
Theoretical and Computational Sciences

NITheCS MINI-SCHOOL:

Introduction to Quantitative Finance

Dr Mesias Alfeus (Stellenbosch University)

Wednesday 5, 12, 19 & 26 July 2023 | 14h00 – 15h00 SAST

LECTURE 1 (5 July 2023)

Bonds and Stocks. Discounting and compounding

In this lecture, you will learn:

- Capital structure of a firm
- Bonds and stocks
- Time value of money
- The yield curve – Term structure of interest rates
- Discount factors
- Bond pricing
- Forward rates

LECTURE 2 (12 July 2023)

Derivative securities

In this lecture, you will learn:

- Absence of arbitrage and its consequences
- Market uncertainty and its representation
- Portfolio and trading strategies
- Forwards, options and derivative securities

LECTURE 3 (19 July 2023)

Absence of arbitrage and its consequences

In this lecture, you will learn:

- Pricing of uncertain payoffs
- Pricing of insurance policies
- The problem with actuarial pricing – case study of a forward contract
- Self-financing strategies
- Arbitrage strategies
- The principle of absence of arbitrage
- The law of one price
- Pricing of a forward contract
- Arbitrage inequalities - Put-Call parity

LECTURE 4 (26 July 2023)

Arbitrage pricing - one-period model

In this lecture, you will learn:

- The simple market model
- Arbitrage conditions on model parameters
- Derivative contracts in a one period model
- Hedge strategies. Replication conditions
- Pricing by replication - Arbitrage pricing of derivatives
- The arbitrage pricing principle
- Pricing of uncertain payoffs
- Interpretation of the hedging cost as a discount expectation
- Risk-adjusted probabilities
- The 'Risk neutral pricing' principal
- Analogy with the actuarial premium principle

Dr Mesias Alfeus is a Senior Lecturer in the department of Statistics and Actuarial Science at Stellenbosch University. He has a PhD in Quantitative Finance from the University of Technology Sydney, Australia. He is a Mathematician by training, with a BSc in Mathematics and Physics from the University of Namibia. He holds masters and honours degrees in Financial Mathematics, both with Cum Laude from SU. He also holds many academic awards, and won the 2018 International Young Investigator Training Program prize at the XIX Workshop on Quantitative Finance held in Italy.

Dr Alfeus has held an academic visiting position at the University of Padova. He has worked as a Risk Analyst at Namibian Financial Institutions Supervisory Authority, Research Associate at UTS Finance, Lecturer in Financial Mathematics at the University of Wollongong, Australia, and an AIFMRM Postdoctoral Research Fellowship at UCT. His papers have been published in leading journals. His research interests focus on Computational and Mathematical Finance, more specifically in numerical methods for pricing of options and model calibration, including model empirical analysis.

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