

# **FIN312 Mathematics and Programming for FinTech**

**Level:** 3

**Credit Units:** 5 Credit Units

**Language:** ENGLISH

**Presentation Pattern:** EVERY SEMESTER

## **Synopsis:**

FIN312 Mathematics and Programming for FinTech aims to equip students with suitable mathematical and programming skills to measure data, to read, understand, apply and implement models, so as to provide solutions to problems that arise from both conventional finance as well as FinTech. The course builds up the ability to interpret with mathematical models, and then to translate the models into a programming language for implementation. This is a valuable and repeatable skill in the digitalised world. A single, well-known, programming language (e.g. Python) is used throughout the course to help the student pick up knowledge around the art of translation as well as to be able to efficiently handle financial data and to reason with it. Various scenarios from finance, ranging from the traditional setting of risk and return to the modern setting of FinTech, are used as examples to reinforce the link between mathematical modelling and programming.

## **Topics:**

- Structured data and unstructured data
- Statistical models
- Pricing of simple financial products
- Data structures and representation in Python
- Trading strategies using equities, cryptocurrencies and option combinations
- Performance metrics of trading strategies
- Introduction to symmetric and asymmetric cryptography
- Hash functions
- Digital signatures
- Bitcoin protocol
- Python packages for financial data downloading
- Python packages for data handling and visualisation

## **Textbooks:**

McKinney, W (2017): Python for Data Analysis (Second edition) (eText) 2nd edition O'Reilly  
ISBN-13: 9781491957615

**Learning Outcome:**

- Distinguish between structured and unstructured data used commonly in financial applications.
- Formulate statistical models to represent financial data.
- Appraise cryptographic primitives underlying security in cryptocurrency networks and calculate network statistics regarding the systems.
- Implement Python programs to acquire financial data using APIs.
- Use Python to automate large-scale financial calculations.
- Operate a financial information system for obtaining market data and information.

**Assessment Strategies (Daytime Class):**

<b>Components</b>	<b>Description</b>	<b>Weightage Allocation (%)</b>
Overall Continuous Assessment	PRE-COURSE QUIZ 1	2
	PRE-COURSE QUIZ 2	2
	PRE-COURSE QUIZ 3	2
	TUTOR-MARKED ASSIGNMENT 1	18
	GROUP BASED ASSIGNMENT 1	20
	PARTICIPATION 1	6
Overall Examinable Components	Written Exam	50
<b>Total</b>		<b>100</b>