

NUS School of Computing **Master of Science in Digital Financial Technology (MSc DFinTech)**

Core/Essential Modules (28MC)

FT5001 to FT5005 are new modules designed to instil core FinTech competencies covering *Artificial Intelligence, Blockchain, and Data Analytics*. Among the 28MC essential modules, BMD5301 and BMD5302 cover the basics of finance and are offered by the NUS Business School. IT5001 and IT5003 cover the basics of computing. The objective is to ensure all students graduate with solid training in both *computing* and *finance* foundation.

1. FT5001 (2MC) Fintech Innovations for Consumers
2. FT5002 (2MC) Digital Transformation at Financial Institutions
3. FT5003 (2MC) Blockchain Innovations
4. FT5004 (2MC) Programming for Blockchain Applications
5. FT5005 (4MC) Machine Learning for Finance
6. BMD5301 (4MC) Introduction to Finance for FinTech Professionals
7. BMD5302 (4MC) Financial Modelling for FinTech Professionals
8. IT5001 (4MC) Software Development Fundamentals
9. IT5003 (4MC) Data Structures and Algorithms

Students who have taken modules similar to BMD5301, IT5001, and IT5003 can replace these modules by taking the following replacement modules*:

10. IT5004 Enterprise Systems Architecture Fundamentals,
11. IT5005 Artificial Intelligence, or
12. IT5006 Fundamentals of Data Analytics.

***Note:** Students who wish to take replacement modules are required to submit their request to the School of Computing for prior approval. All other core modules are required for all students.

Module Descriptions (Core Modules)

FT5001 - Fintech Innovations for Consumers (2MC)

The objective of this module is to provide a technological overview of the eco-system of FinTech innovations for consumers. Particularly, this module will cover important business models and innovations in payment solutions, crowd-funding platforms, investment and robo-advisors, and other important FinTech innovations that affect the personal finance of individual consumers.

FT5002 - Digital Transformation at Financial Institutions (2MC)

The objective of this module is to provide a technological overview of the business functions of modern banking, insurance, and investment sectors. Students will learn how FinTech is transforming the business operations in these financial firms. Particularly, this module covers smart credit analytics, RegTech, InsurTech, AI and banking, and other new topics of FinTech at large financial institutions. This module also serves the purpose to teach students about the basics of banking and insurance.

FT5003 - Blockchain Innovations (2MC)

Blockchain technologies could be the most disruptive FinTech technologies. This module covers the important topics of blockchain innovations. Students will learn the architecture of blockchain, the history and evolution of blockchain applications, and the case studies of state-of-art blockchain applications in the industry.

FT5004 - Programming for Blockchain Applications (2 MC)

This module provides an overview of the essential concepts of blockchain protocol. Students will learn programming skills for developing blockchain applications. Students will learn the knowledge needed to create nodes on a personal blockchain, create accounts, unlock accounts, mine, transact, and check

balances. Students will also learn the decentralized peer-to-peer network.

FT5005 - Machine Learning for Finance (4MC)

This module covers foundation knowledge in machine learning and data mining for solving practical analytics problems or building AI applications at FinTech firms. Some topics covered including supervised learning models, time series forecasting methods, basics of sentiment analysis and text mining, and reinforcement learning.

BMD5301 - Introduction to Finance for FinTech Professionals (4MC)

This module aims to provide students with the foundation to understand the key concepts and tools used in Finance, which are necessary for managers and analysts to make sound financial decisions. Topics covered include discounted cash flow models, risk and return, capital budgeting, valuation of stocks and other financial securities, as well as an overview of financial markets and financial institutions.

BMD5302 - Financial Modelling for FinTech Professionals (4MC)

This course introduces Finance models used in corporate finance, portfolio management, derivatives and bonds. It takes an applied approach by implementing through Excel, VBA and Python.

IT5001 - Software Development Fundamentals (4MC)

This module aims to introduce non-computing students to the principles and concepts of software development at an accelerated pace. Students will be introduced to the basics of programming (control flow, code and data abstraction, recursion, types, OO), development methodology (ensuring correctness, testing, debugging), simple data structures and algorithms (lists, maps, sorting), and software engineering principles. Through hands on assignments and projects, students will learn good software development practices (documentation, style) and experience a typical software engineering cycle.

IT5003 - Data Structures and Algorithms (4MC)

This module introduces non-computing students to efficient computational problem solving in an accelerated pace. Students will learn to formulate a computational problem, identify the data required and come up with appropriate data structures to represent them, and apply known strategies to design an algorithm to solve the problem. Students will also learn to quantify the space and time complexity of an algorithm, prove the correctness of an algorithm, and the limits of computation. Topics include common data structures and their algorithms (lists, hash tables, heap, trees, graphs), algorithmic problem solving paradigms (greedy, divide and conquer, dynamic programming), and NP-completeness.

****Important: Modules in this list may be subject to change as decided by the Schools/Departments.***