

# **Cryptography and Cryptocurrencies: The money of the future**

## **(Synchronous e-Learning)**

### **Introduction**

The global economy is moving towards a digital money, as from investment to money transfer, everything is going paperless. The most promising addition to the digital payment sector is cryptocurrency and it has already become a global phenomenon. The banks, governments and companies are aware of its importance; however, most people do not understand how it works and what technologies are behind it. Thus, the purpose of this course is to explain the basic concepts of cryptography and cryptocurrencies and the understanding of technologies used to create, protect and safely use cryptocurrencies in the cyber world.

### **Course objectives**

This course intends to provide participants with concepts of cryptography and cryptocurrencies and the understanding of necessary technologies used for the future digital currency.

### **Course outline**

#### **Session 1: Cryptography**

Introduction to cryptography. Encryption and Decryption process, Types of cipher, Stream and Block cipher, Additive cypher.

#### **Session 2: Secret key and Public key cryptography**

Secret Key and its limitations, DES and AES Algorithms. Concepts of public-key cryptosystems, the trapdoor function, Diffie-Hellman key exchange.

#### **Session 3: Public Key cryptography and Digital Signature**

RSA Algorithm, Hashing, digital signature and digital certificates.

#### **Session 4: Blockchain Technology**

Introduction to P2P networking, Distributed Ledger Technologies, concept of blockchain, Types of Blockchains.

## **Session 5: Cryptocurrencies Technology**

Introduction to crypto currencies, mining of coins, transactions of coins, properties of digital coins, examples of cryptocurrencies (Bitcoins, Litecoin, Ethereum, Ripple), future of cryptocurrencies.

## **Session 6: Group Presentation**

### **Teaching Methodology**

“Live” online class, with live demos, case studies, videos, interactive short quizzes.

### **Duration**

2.5 hours x 6 sessions

### **Instructor**



#### **Dr Siyal**

Dr Siyal holds MSc and PhD degrees in Computer Engineering from University of Manchester, UK and an MBA (specializing in IT) degree from European Management School, Surrey University, England.

Dr Siyal has been working in Universities in Europe and Asia and has been involved in teaching, research and supervising/advising students in multi-disciplinary areas such as in Cyber Security, IT management, E-commerce, AI and Big Data, Blockchain, Microprocessors, Computer vision and medical image processing at the school of EEE, NTU, Singapore.

Dr Siyal has published over 200-refereed journal and conference papers and has authored 8 books. At NTU, he has won numerous teaching awards including “Best Dressed Teacher”, “Teaching Excellence Award” and “Nanyang Teaching Excellence Award”. He was Singapore’s National Day Award recipients in 2018.