UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# Digital Innovation and Finance

**2324-3-E1803M125**

## Learning objectives

The student will be able to:
i. understand the main actors of the fintech ecosystem (bans, regulators, new incumbents)
ii. develop an in-depth view of the applications of digital technology such as crowdfunding and token offerings along with the traditional subjects (venture capital, business angels, accelerators, ...) in the entrepreneurial finance domain.
iii. describe the operations of traditional e digital entrepreneurial finance subjects through the analysis of start-up financing rounds
iv. apply Game theory, computer science (distributed systems, distributed consensus), and monetary theory elements on bitcoin market and the associated blockchain technology.

## Contents

The course explores the widespread digital innovation in the financial sector and, in particular, the development of Fintech companies and Blockchain assets. Students will develop an in-depth view of Fintech market participants, regulation, and how new digital innovation has enlarged payment, investment, and financing opportunities for companies and individuals.
The first part of the course allows students to understand (1) the Fintech landscape and how fintech has changed the relationship with traditional banking services; (2) the applications of digital technology such as crowdfunding and token offerings along with the traditional subjects (venture capital, business angels, accelerators, ...) in the entrepreneurial finance domain.
The second part of the course is focused on bitcoin and the associated blockchain technology.
Starting from a computationally focused approach to elliptic curves over finite fields and presenting the discrete logarithm problem as the cornerstone of public-key cryptography, bitcoin is introduced as an ingenious breakthrough innovation. Its game theory, computer science (distributed systems, distributed consensus), and monetary theory elements are examined in the attempt to properly convey the interdisciplinarity of the topic and appreciate its relevance.

Technical and programming elements about digital signatures, blockchain, Merkle tree, addresses, transactions, and timestamping are also provided to assess features and limits of the Bitcoin protocol.

## Detailed program

## Prerequisites

There are no strict prerequisites, even if some familiarity with algebra and finance might help to appreciate the course. While a rigorous formal approach is almost impossible in a course touching on so many and so different knowledge areas, intellectual curiosity is stimulated about the interplay between maths, cryptography, economic incentives, technology, monetary theory, regulatory issues, and politics.

## Teaching methods

Slide based lessons with associated bibliography and working group.

## Assessment methods

Multi-choice questions test and team project work.

## Textbooks and Reading Materials

Suggested reading
Ferdinando Ametrano, "Bitcoin: oro digitale, finanza e tulipani",
https://docs.google.com/document/d/1gecm0uT43tl8d4WFYNs9H_v3p70PPfPmQITR4GxSWkE

Technology references
Satoshi Nakamoto,
“Bitcoin: A Peer-to-Peer Electronic Cash System” (2008),
https://bitcoin.org/bitcoin.pdf
A. Narayanan, et al.,
“Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction” (2016),
Princeton University Press, 978-0691171692,
https://www.coursera.org/learn/cryptocurrency, https://bitcoinbook.cs.princeton.edu,
https://bitcoinbook.cs.princeton.edu, https://www.lopp.net/pdf/princeton_bitcoin_book.pdf
Pedro Franco,
“Understanding Bitcoin: Cryptography, Engineering and Economics” (2014),
Wiley, 978-1119019169
Ferdinando Ametrano,
“Bitcoin, Blockchain, and Distributed Ledgers: Between Hype and Reality” (2017),
https://ssrn.com/abstract=2832249
Monetary theory references

Friedrich A. Hayek,
“Denationalisation of Money: The Argument Refined”,
https://mises.org/library/denationalisation-money-argument-refined
Ferdinando Ametrano,
“Hayek Money: The Cryptocurrency Price Stability Solution” (2014),
https://ssrn.com/abstract=2425270
Ferdinando Ametrano,
“Bitcoin: oro digitale per nuovi standard monetari (2020),
published in “Dal sesterzio al bitcoin”, Rubettino Editore (edited by Angelo Miglietta, and Alberto Mingardi)
https://drive.google.com/file/d/1-1k3wlL6ElZzJMjSakTjTNetJl5ws6wL

## Semester

II Semester

## Teaching language

English

## Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE