UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Sustainability and Technology for Finance

2526-3-E1803M123

Learning objectives

Knowledge and Understanding
The course provides students with a solid understanding of alternative finance instruments and the technologies and processes behind cryptocurrencies. In addition to the foundations of entrepreneurial finance, the program offers an in-depth exploration of fully digital tools such as crowdfunding and token offerings, as well as the technological mechanisms of the crypto world — including blockchain, smart contracts, tokenomics, and DeFi — which are essential to understanding how capital is innovatively generated, raised, and managed.
The student will be able to:
i. understand the main actors of the fintech ecosystem (banks, regulators, new entrants);
ii. develop an in-depth view of digital technology applications such as crowdfunding and token offerings, alongside traditional players (venture capital, business angels, accelerators, ...) in the entrepreneurial finance domain;
iii. describe the operations of both traditional and digital entrepreneurial finance actors through the analysis of start-up funding rounds.

Applying Knowledge and Understanding
Students will be able to use specialized databases containing financial and economic information on high-tech start-ups, as well as analyze specific business cases in detail by applying evaluation and comparison methods.
They will also be able to apply elements of game theory, computer science (distributed systems, distributed consensus), and monetary theory to the bitcoin market and related blockchain technology.

Transversal Skills:

Independent judgment: Through business case analysis, students will develop critical thinking regarding the life cycle of high-tech enterprises.
Communication skills: Students will present their analyses in class.
Ability to continue learning independently: After completing the course, students will be able to independently use the main financial and economic databases for the analysis of companies and tech-driven start-ups.

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

- Fintech: startups, banks, regulators and incumbent
- Payment world: new actors and new technology
- Crypto currency ecosystem
- Enabling technlogies of digital currency
- Start-up financing cycle
- Seed finance: accelerator, business angels and incubators for supporting innovation
- Venture capital and Private equity
- Digital financa platforms: crowdfunding
- Token offerings: ICOs and STOs

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

The course is composed of lectures, working group and online materials:

- 12 hours online materials available on the course page (video, reading, database)
- 30 hours of lectures

Assessment methods

During the course period, the assessment of learning takes place in stages:
-Carrying out and delivering case studies proposed during the lessons and at home (group work 4)
-End-of-course test structured with multiple choice and 4 open questions

The final evaluation will be composed as follows:
30% vote on cases carried out
70% final test

During the official exams, the assessment of learning is carried out through a written exam:
30 multiple-choice questions + 4 open-ended questions
Grading scale: –0-3 points multiple choice questions –15-30 open-ended questions (12 with no answer).

Textbooks and Reading Materials

Suggested reading
Entrepreneurial Finance: The Art and Science of Growing Ventures Luisa Alemany, Job J. Andreoli, Cambridge University Press
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/1-1k3wlL6ElZzJMjSakTjTNetJI5ws6wL

Semester

II Semester

Teaching language

English

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE