Financial applications of blockchains and distributed ledgers
Xu Jiahua

Cursus
Ing. finance
Mineur en Ingénierie financière

Sem. MA1, MA3
H

Type Opt.

Language English
Credits 2
Withdrawal Unauthorized
Session Winter
Semester Fall
Exam During the semester
Workload 60h
Weeks 14
Hours 2 weekly
Lecture 1.5 weekly
Number of positions

Remarque
Special schedule: see the IF website http://sfi.epfl.ch/mfe/study-plan

Summary
This course provides an introduction to distributed ledger technology, blockchains and cryptocurrencies, and their potential applications in finance and banking.

Content
The course covers the basics of cryptography and its applications to cryptocurrencies; historical examples of centralized cryptocurrencies; foundations of modern decentralized cryptocurrencies; Byzantine fault tolerant consensus; mechanics of Bitcoin platform including storage, mining, wallets, etc.; alternative platforms, including Ethereum, Ripple and EOS; smart contracts; potential applications of decentralized ledgers in finance and their pros and cons.

Keywords
Electronic Money, Cryptocurrencies, Distributed Ledger Technology, Blockchain, Bitcoin, Ethereum, Smart Contracts

Learning Prerequisites
Recommended courses
Introduction to Finance

Important concepts to start the course
Cryptography, Databases, Payment Systems

Learning Outcomes
By the end of the course, the student must be able to:
• Use basic cryptographic concepts including private/public keys, signatures, hash functions, Merkle trees
• Distinguish between different types of blockchain (private vs public, permissioned vs non-permissioned, etc.) and cryptocurrencies (utility tokens, security tokens, stablecoins etc.)
• Recall historical examples of electronic money
• Formulate alternative approaches to Byzantine fault-tolerant consensus including proof of work, proof of stake, etc.
• Sketch the basic setup of Bitcoin, Ethereum, Ripple and EOS
• Conduct wallet installation, inter-wallet transactions and cryptocurrency trading
• Critique misuse of blockchains
• Investigate fraudulent activities in the crypto-market
• Present existing examples of DeFi (Decentralizing Finance)
• Explore potential financial applications of DLT (Distributed Ledger Technology)
• Propose business strategies for blockchain start-ups

Transversal skills
• Access and evaluate appropriate sources of information.
• Communicate effectively with professionals from other disciplines.
• Demonstrate the capacity for critical thinking

Teaching methods
Lectures, exercises, group project

Assessment methods
20% Homework
40% Group presentation and report
40% Individual essay

Supervision
Office hours Yes
Assistants Yes
Forum Yes

Resources
Virtual desktop infrastructure (VDI)
No

Bibliography

Ressources en bibliothèque
• Bitcoin and Cryptocurrency Technologies / Narayanan