FIN-413

Financial applications of blockchains and distributed ledgers

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Cursus	Sem.	Type
Financial engineering minor	E	Opt.
Financial engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	**3 weekly**
Lecture	2 weekly
Project	1 weekly
Number of positions	

It is not allowed to withdraw from this subject after the registration deadline.

Remark

Special schedule. See the MFE website: https://go.epfl.ch/fe

Summary

This course provides an introduction to Distributed Ledger Technology (DLT), blockchains and cryptocurrencies, and their applications in finance and banking and draws the analogies between Traditional Finance (TradFi) and crypto and the ways investors/traders can transact in those worlds.

Content

- Introduction to blockchain, layers (L1, L2), application layer, decentralized governance, tokenomics
- TradFi: financial services, products and landscape
- Crypto: Centralized crypto exchanges (CEXs) vs. Decentralized blockchain-based venues (DEXs)
    - Limit order book vs. Automated Market Makers (AMM)

- DeFi landscape, composability and money-legos
- Stablecoins
- On-chain credit: borrow/lending, interest rate benchmarks and interest rate setting mechanism
- Counterparty credit risk and mitigation mechanisms in TradFi vs. DeFi
- Derivatives trading in TradFi vs. DeFi
- Applications/Use cases:
    - Structured products example: A reverse convertible on ETH under TradFi and DeFi product wrapper
        - Settlement mechanics and involved parties
        - Collateral considerations to manage counterparty credit risk
        - Annual Percentage Yield (APY) and key risks under both product wrappers

- Securitization and tokenizing TradFi financial instruments:

- TradFi products for DeFi yield, and
- TradFi collateral for accessing DeFi funding
- Securitization and credit tranching for on-chain financial products

- Cross margining, concentration risk, capital efficiency and Lombard lending under DeFi

Keywords

Cryptocurrencies, Distributed Ledger Technology, Blockchain, Bitcoin, Ethereum, Smart Contracts, Decentralized Finance

Learning Prerequisites

Recommended courses

Introduction to Finance, Derivatives

Important concepts to start the course

Databases, Interest rates, Counterparty credit risk, Derivatives

Learning Outcomes

By the end of the course, the student must be able to:

- Distinguish between different types of blockchain (private vs public, permissioned vs non-permissioned, etc.) and cryptocurrencies (utility tokens, security tokens, stablecoins etc.)
- Explain the concepts of smart contracts, Layer 1 and 2, and CEXs vs DEXs
- Reconstruct the various AMMs implementations
- Present existing examples of DeFi (Decentralized Finance) in areas such as borrow/lending and derivatives businesses
- Compare financial products offered in TradFi vs. DeFi under various formats and analyze implications on credit counterparty risk and capital efficiency
- Present various examples of two-way bridges between TradFi and DeFi

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, group project

Assessment methods

- 60% Group essay

- 40% Group presentation

Supervision

Office hours	Yes
Assistants	No
Forum	No

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

Cryptocurrencies: Money, Trust and Regulation (https://epfl.swisscovery.slsp.ch/permalink/41SLSP_EPF/1g1fbol/alma99116897841005516)

Ressources en bibliothèque

- Cryptocurrencies / McDonald

Moodle Link

- https://go.epfl.ch/FIN-413