

# PhD Curricula - Blockchain and Distributed Ledger Technology

## Curriculum 4: Economics and finance

This curriculum is aimed at Ph.D. candidates who are interested in studying blockchain and distributed ledger technology in economics and finance with a multidisciplinary approach. As one of the most notable blockchain applications, this track will consider the socio-economic, legal, organizational, and technological aspects of cryptocurrencies, central bank digital currencies and non-fungible tokens (NFTs). These include: investigating the user trust and reputation mechanisms behind the shift from institutional, centralized currencies to digital, decentralized ones; assessing how financial and governmental institutions respond to the rise of cryptocurrencies, including the emergence of central bank digital currencies; analyzing cryptocurrency and NFT transactions for the detection of anomalies, frauds, suspicious behavior (cyber-crime), communities, and motifs; business models of token-based economies; developing anonymization and de-anonymization techniques; studying the interplay between cryptocurrency/NFT and social media/virtual worlds; exploring real consequences of virtual money from the metaverse, evaluating the performance and reliability of blockchain algorithms and implementations; analyzing the sustainability of digital ledgers in terms of their energy and environmental footprint, combining game theory, economics and cryptography to understand the incentive models underlying distributed blockchain protocols. The track will also be concerned with research in platform economies and smart contracts as a way to execute actions automatically when agreed-upon conditions are met. Furthermore, it will study communication/interactions protocols to allow blockchain participants to achieve a common goal. Ph.D. candidates will have the opportunity to explore: (programming) languages for the specification of smart contracts; techniques for the analysis and verification of correctness and compliance of smart contracts; legal and regulatory aspects; game theory applied to human-algorithm interaction; psychology of money. Ph.D. candidates in this track may also study blockchain in supply chain management for the digitalization and certification of trade documents and NFTs to protect intellectual property rights.

### Keywords:

- Central Bank Digital Currency
- Credit market and financial services
- Illegal markets detection
- Internet of Money
- Valuation services and financial advising
- Business models for DLTs-based financial players
- The economics of DLTs-based financial markets
- Banking & Finance
- Digital asset/Crypto-assets
- Entrepreneurial finance