

E333: Blockchain and Cryptocurrencies – A Hands-On Lecture

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Winter Semester 2026/27

Lecture (3 SWS), 6 ECTS

Method of Assessment: Portfolio

2 online tests during the semester (interaction with the blockchain), each worth 25%

1 final exam at the end of the semester (written exam in the classroom, *not* online!), worth 50%

For other modules in economics and more information consider the economics teaching website
<http://vwl-tuebingen.de/> !

Schedule:

Monday, 16:15 – ca. 18:45, online live stream via Zoom (see link in ILIAS)

Content (preliminary):

1. Introduction and Overview
2. Cryptography, Keys, Hashes and Some Mining
3. How Does Bitcoin Work?
4. Transactions and Wallets
5. Ethereum and Smart Contracts
6. Create Your Own Token with Solidity
7. Automated Market Makers and Liquidity Pools
8. DeFi II: Lending, Oracles and MEV
9. Proof of Stake
10. NFTs and Tokenization
11. Regulation and Stablecoins
12. Central Banks and CBDCs
13. Scaling Solutions (Layer 2)

This module provides a hands-on *introduction* to the crypto world. In the first meetings, we mine our first coins on our own course blockchain and use our wallet to access and transfer them. We learn how Bitcoin's proof of work mechanism differs from more “novel” approaches like proof of stake. We also mint our own non-fungible token (NFT) and discuss potential real-world applications such as tokenized assets. Moreover, we study whether DeFi (decentralized finance) that uses blockchain technology can be a substitute or complement to legacy finance (e.g., we will use a DEX (decentralized exchange) to trade one coin/token for another and discuss liquidity pools that can give rise to “impermanent loss”). We then turn to lending protocols, oracles and MEV. After discussing the purpose and risks of stablecoins like Tether and the failure of UST (Terra/Luna), we address the pros and cons of regulation and CBDCs (central bank digital currencies).

Literature:

Lecture slides and additional material will be provided during the lecture. For the introduction (basically the first 4 chapters) I will use the textbook “The Basics of Bitcoins and Blockchains” (2021) by Antony Lewis (Mango Publishing).