

15.492 Crypto Finance

Professor Fahad Saleh

`fsaleh@mit.edu`

Spring 2024 H4, Thursday 5-8 PM

Course Description

This course provides an introduction to blockchain and cryptofinance. We begin by discussing how a blockchain operates without a centralized intermediary, focusing especially on the Proof-of-Work and Proof-of-Stake blockchain protocols. The course then transitions to introducing smart contracts and clarifying how smart contracts are applied to form decentralized applications that provide financial services. Specific smart contract applications that we discuss include fungible tokens, non-fungible tokens, decentralized exchanges and lending platforms.

Course Text

“Smart Contracts and Decentralized Finance”

by K John, L Kogan and F Saleh

Annual Review of Financial Economics, Volume 15.

Course Outline

- Lecture 1, 04/04/2024
 - 1.) Technical Description of Blockchain
 - 2.) Bitcoin’s Proof-of-Work Protocol
 - 3.) Longest Chain Proof-of-Stake Protocols

- Lecture 2, 04/11/2024
 - 1.) Guest Lecture by Alex Stokes (Ethereum Foundation): Ethereum’s Protocol
 - 2.) Smart Contract Mechanics
 - 3.) Benefits and Limitations of Smart Contracts

- Lecture 3, 04/18/2024
 - 1.) Fungible Tokens
 - 2.) Guest Lecture by Gordon Liao (Circle): Stablecoins

- Lecture 4, 04/25/2024
 - 1.) In-Class Exercise: Acquiring and Trading Tokens
 - 2.) Guest Lecture by Lee Schneider (Ava Labs): Cryptofinance Regulation

- Lecture 5, 05/02/2024
 - 1.) Decentralized Exchanges
 - 2.) Lending Platforms
 - 3.) Maximal Extractable Value
- Lecture 6, 05/09/2024
 - 1.) Non-Fungible Tokens
 - 2.) In Class Exercise: Minting Non-Fungible Tokens

Assessment Policy

Assignment	Weight
Class Participation	30%
Smart Contract Project	70%

Class Participation

Class participation will be based mainly on student engagement with in-class exercises. Crucially, these exercises will involve interaction with a blockchain so that participation can be corroborated with evidence directly from the blockchain. In particular, students will be shown how to read from a website that displays blockchain activity (see <https://etherscan.io/>) and will be required to provide a URL from that interface to corroborate participation. Some exercises will require students to conduct activity before class, and students will also be required to provide evidence of such activity from the web interface. Tasks will include setting up a digital wallet, acquiring ether, acquiring a fungible token, transferring fungible tokens and minting non-fungible tokens.

Smart Contract Project

This project requires student groups to propose a business idea to be implemented via smart contracts on the Ethereum blockchain. Each group must submit a white paper supporting their business idea. The white paper must answer the following questions regarding your business idea:

- 1.) Who is/ are your target demographic(s)?
- 2.) What is the closest existing competitor to your idea?
- 3.) Given the competitors, why would your target demographic prefer your business?
- 4.) Why deploy your idea on blockchain rather than in a centralized context?
- 5.) How is your business technically feasible for implementation on Ethereum?
- 6.) How is your business economically-viable for implementation on Ethereum?
- 7.) How might scale improvements of Ethereum affect your business?

Groups are encouraged to base their proposals on existing ideas by proposing improvements on promising existing ideas. Students are particularly encouraged to consider ideas in the realm of Decentralized Finance (DeFi). For a list of prominent ideas in the area of DeFi, students are encouraged to consult www.defillama.com, which also provides additional links with details regarding existing businesses.