Spring 2022 FINA 6125 – Cryptocurrency, Blockchain, and Their Business Applications

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Office hours are by appointment only.

Course website and calendar:
http://www.vivianfang.org/teaching.html
(Please check frequently for updates.)

COURSE DESCRIPTION

This course introduces cryptocurrencies (including Bitcoin, Ether, and prominent altcoins) and blockchain. The course first explains the history of cryptocurrency and the fundamentals of blockchain including cryptography and consensus mechanism. Although technical, this part is essential to establish a foundation to understand cryptocurrencies and blockchain. After learning the basics, we will then discuss the practical details of cryptocurrencies (e.g., how to buy, mine, store, and use them), altcoin investments, enterprise applications of blockchain, smart contracts, and new developments in the crypto markets, e.g., non-fungible tokens (NFTs) and decentralized finance (DeFi). Finally, we will discuss the regulatory risk and political environment for the crypto markets in the United States. If we still have time left, we will also discuss trends in token offerings and valuation approaches for crypto assets. We will sometimes have industry experts to give guest lectures on the real-world blockchain applications and interact with students. The goal of the course is to provide students with a basic set of skills to understand cryptocurrencies and blockchain and how businesses can use them.

COURSE MATERIAL

No required textbook. The following are some suggested reading/watching materials.

Key Materials:
- Bitcoin: A Peer-to-Peer Electronic Cash System (Satoshi Nakamoto, 2009)
- The idea of smart contracts (Nick Szabo)

Introductory Materials and Short Videos:
- Explain Bitcoin Like I'm Five (Non-technical)
- Blockchain explained (Non-technical) [6 minutes]
- The Essence of How Bitcoin Works (Non-technical) [5 minutes]
- Introduction to Bitcoin (Non-technical) [37 minutes]
- How Bitcoin Works Under the Hood (Somewhat technical) [22 minutes]
- How Bitcoin Works in 5 Minutes (Technical) [5 minutes]
- Ever wonder how Bitcoin (and other cryptocurrencies) actually work? (Technical) [26 minutes]
- Digital Currency Tutorials (Coindesk Q&A)

On-Line Course:
- Bitcoin and Cryptocurrency Technologies (Coursera, done by Arvind Narayanan and follows the recommended book below. Advanced)

Recommended Books:
- The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order (Published in 2015; Wall Street journalists Paul Vigna and Michael J. Casey, explains cryptocurrency)
- Bitcoin and Cryptocurrency Technologies. Princeton University Press (Released in 2016. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder.) [Book based on a Coursera by the same name

run by Arvind Narayanan. Lectures also on [YouTube](#).] A full pre-publication draft can be downloaded at no cost at the following link:

https://d28rh4a8wq0iu5.cloudfront.net/bitcointech/readings/princeton_bitcoin_book.pdf

- [Cryptoassets. The Innovative Investor's Guide to Bitcoin and Beyond](#). (Published in 2017. Chris Bruniske and Jack Tatar.)

- [The Truth Machine: The Blockchain and the Future of Everything.](#) (Published in 2018, Wall Street journalists Paul Vigna and Michael J. Casey, focus on blockchain use cases)

COURSE OUTLINE (subject to change and adjustment)

Topic 1: Blockchain and Cryptocurrency Overview
- o   What is cryptocurrency and Blockchain?
- o   History of cryptocurrency
- o   How is it different from fiat currency?
- o   Current state of the field

Suggested Reading:
Narayanan et al., Preface

Additional Reading:
Bruniske and Tatar, Ch. 1-3
[Untraceable Electronic Cash (Chaum, Fiat and Naor 1990)](#)

Topic 2: Blockchain Technology and Cryptography
- o   Blockchain overview
- o   Basics of cryptography in the blockchain
- o   Decentralized digital identity
- o   Transactions
- o   Block building and consensus mechanism

Suggested Reading:
Narayanan et al., Ch. 1-3, 5

Topic 3: Practical Use of Cryptocurrency and New Developments in the Crypto Market
- o   Cryptocurrency ecosystem, leading cryptocurrencies, and altcoins
- o   Investing, mining, storage, and practical use of cryptocurrencies
- o   Cryptocurrency and anonymity
- o   NFTs

Suggested Reading:
Narayanan et al., Ch. 4, 6

Additional Reading:
Bruniske and Tatar, Ch. 4, 14-15

Topic 4: Enterprise Applications of Blockchain
- o Pros and Cons of using blockchain
- o Blockchain applications in various sectors
- o Notable blockchain consortiums
- o Business decisions about blockchain

Topic 5: Smart Contracts
- o What is a smart contract?
- o Advantage of smart contracts
- o Applications of smart contracts
- o Other use cases and characteristics (e.g., DeFi)

Suggested Reading:
Narayanan et al., Ch. 9

Topic 6: Crypto Regulation, Political Environment, Token Offering, and Valuation of Cryptocurrency
- o Crypto regulatory risk
- o Crypto political environment
- o Trends in token offerings (e.g., ICOs, IEOs, and STOs)
- o Tokenomics
- o Basic crypto valuation approaches

Suggested Reading:
Narayanan et al., Ch. 7
SEC Release No. 81207 (The DAO)

Additional Reading:
Bruniske and Tatar, Ch. 16

Links to data sources:
Bitcoin marketcap: https://www.blockchain.com/charts/market-cap
Cryptocurrency marketcap: https://coinmarketcap.com/
Bitcoin transactional value: https://www.blockchain.com/charts/estimated-transaction-volume-usd
More cryptocurrency data: https://coinmetrics.io/data-downloads/
Additional tools: https://coinmetrics.io/

Additional Reading:
Bruniske and Tatar, Ch. 6-13

COURSE EVALUATION

Quizzes	20%
Class Participation	10%
Individual Assignments	20%
Group project (including presentation)	50%
Total	100%