

Introduction to Blockchain and Cryptocurrencies

INSTRUCTORS

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COURSE OVERVIEW

This course will introduce fundamental concepts and a high-level overview of the burgeoning blockchain and cryptocurrency space. The course will begin by providing a background in fundamental concepts in Computer Science such as in cryptography, distributed systems, and data structures. It will then move on to an in-depth overview of blockchain, the history of Bitcoin, a discussion of money and the proliferation of new consensus models, tokens, smart contracts, and more. Industry guest speakers will share their perspectives.

No prior knowledge will be required to take this course.

COURSE SCHEDULE

Week	Subject
Week 1	Intro to Computer Science Topics – Hash Functions, Cryptography, and Distributed Systems
Week 2	Intro to Money, Bitcoin and Blockchain
Week 3	Ethereum, Smart Contracts and Misc. Alternative Coins/Tokens
Week 4	Permissionless vs. Permissioned Blockchain and Potential Use-Cases;
Week 5	(tentative) IBM Workshop on Permissioned Blockchains
Week 6	In Class Presentations

GRADING

The course grade will be based on a final project where students will be required to make a 15-minute presentation on a crypto-project of their choosing to the class in the final week. Teams of four will be randomly assigned. The presentation should include a high-level overview of the project, background on the team, the underlying technology and the use case the project hopes to address.

COURSE OUTLINE (TENTATIVE)

Week 1 – Intro to Computer Science Topics – Cryptography, Distributed Systems, and Data Structures

This session will give a quick overview of a few fundamental concepts in Computer Science necessary to understand Blockchain. These will include hash functions, public key cryptography, distributed systems, fundamental data structures and related concepts.

Week 2 – Intro to Money, Bitcoin and Blockchain

Drawing on the Computer Science concepts introduced in the previous week, this session will be a deep dive into the Blockchain described in the seminal Bitcoin white paper written by the pseudonymous online identity of Satoshi Nakamoto. This session will also discuss the origins and purpose of money and compare and contrast Bitcoin as money compared to other types.

Guest Speaker: TBD

Week 3 – Ethereum, Smart Contracts and Alternative Coins/Tokens & Consensus Models

With our understanding of ‘Nakamoto Consensus’ from week 2, in this session we will add additional functionality to the blockchain by learning about Smart Contracts as enabled by Ethereum. We will discuss their application in creating and managing tokens and assess their usefulness and legality as a means to raise capital via Initial Coin Offerings. In addition, we will look at a couple notable smart contracts which ended in catastrophic failures (the DAO and Parity Wallet). If time permits, other topics will include ‘Hard Forks’, new consensus models, and anti-sybil mechanisms (Proof-of-work vs. Proof-of-stake).

Guest Speaker: TBD

Week 4 – Permissionless vs. Permissioned Blockchains and Potential Use Cases

In this week, we will distinguish two competing blockchain realms – permissionless vs. permissioned. Part of this comparison will lead us to discuss the question and concept of data integrity and immutability. Two companies offering data integrity and immutability services will be compared and contrasted.

Guest Speaker: TBD

Week 5 – Blockchain Industry Leader Workshop (e.g. with IBM)

TBD

Week 6 – In Class Presentations

Students will give presentations to the class in this session.