

Module Title: Blockchain and Web3
Spring Trimester 2023/2024

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Virtual Office Hours: By appointment (email)

Module Description

This module deals with blockchain technology and the emerging Web3 ecosystem it enables. We set off on our journey with the original blockchain, Bitcoin, and its attempt to create a new decentralised money system. Our attention then turns to the evolution of the blockchain concept with Ethereum and how Ethereum acts as the foundation for Decentralised Applications (dApps). Our focus will then be on the core applications of Web3 such as Decentralised Autonomous Organisations (DAOs), Decentralised Finance (DeFi) and Non-Fungible Tokens (NFT). Throughout the module, we will aim to gain a comprehensive overview of the modern Web3 ecosystem and learn about the novel career paths it offers.

Learning Outcomes

On completing this module, you will:

- (1) Understand the fundamentals of the Bitcoin and Ethereum blockchains.
- (2) Gain niche insight into Decentralised Applications (dApps).
- (3) Learn how to operate within a Decentralised Autonomous Organisation (DAO).
- (4) Learn about the Web3 job market and how to succeed in it.

Lectures and Workload

This module follows a traditional lecture format for the first half of class and then in the second half you act as a team – a Decentralised Autonomous Organization (DAO) – to help each other learn. My teaching and research are qualitative (social, cultural), rather than quantitative or technical.

We meet twice a week Tuesday 1.30 IST and Thursday 1.30 IST. The module starts on January 16th 2024 and concludes February 13th 2024.

Module Topics and Materials

Lecture 1: Module Overview

A general overview of the module format, assessments and foundational topics. I'll then explain the Decentralised Autonomous Organization (DAO) model we will use in class and we will have our first discussion centred on our current level of knowledge, preconceptions and what we hope to learn about blockchain and Web3.

Lecture 2: Bitcoin

We look at how Bitcoin works from a social and technical perspective. What problem does it solve and what makes it a unique type of digital money?

Read: Bailey AM, Rettler B and Warmke C (Forthcoming) *Resistance Money: The Philosophical Case for Bitcoin*. London: Routledge. Chapters 1-2. PDF will be provided.

Watch: *Khan Academy* (2013) Bitcoin: What is it? (video) | Bitcoin. Available at: <https://www.khanacademy.org/economics-finance-domain/core-finance/money-and-banking/bitcoin/v/bitcoin-what-is-it>

Lecture 3: Ethereum I

We turn our attention to Bitcoin's main competitor, Ethereum, and the Ethereum Virtual Machine (EVM) that powers smart contracts and Decentralised Applications (dApps).

Read: Dylan-Ennis P (Forthcoming) *The Absolute Essentials of Ethereum*. London: Routledge. Chapters 1-2. PDF will be provided.

Watch: *Ethereum in 30 minutes by Vitalik Buterin* | *Devcon Bogotá* (2022). Available at: <https://www.youtube.com/watch?v=UihMqcj-cqc>

Lecture 4: Ethereum II

We continue to focus on Ethereum, but now examine its consensus mechanism, called staking or Proof of Stake (PoS).

Read: Dylan-Ennis P (Forthcoming) *The Absolute Essentials of Ethereum*. London: Routledge. Chapters 3. PDF will be provided.

Watch: *Ethereum's Proof of Stake consensus explained* (2022). Available at: <https://www.youtube.com/watch?v=5gfNUVmX3Es>

Lecture 5: Introduction to Web3

This lecture sets up our transition away from a focus on blockchains towards what gets built on them, which we can characterise as the Web3 ecosystem. We gain an overview of what Decentralised Applications (dApps) are, what they look like and what their benefits are.

Read: Dabit N (2021) What is Web3? The Decentralized Internet of the Future Explained. Available at: <https://www.freecodecamp.org/news/what-is-web3/>

Read: Murray A, Kim D and Combs J (2023) The promise of a decentralized internet: What is Web3 and how can firms prepare? *Business Horizons* 66(2): 191–202.

Lecture 6: Decentralized Autonomous Organizations (DAOs)

We dig deeper into the world of Ethereum and explore how DAOs evolved from an emphasis on the technical autonomy of smart contracts toward a more community-oriented sense of autonomy.

Read: Kerpelman AJ (2021) What is a DAO and What is it For? Available at: <https://daohaus.substack.com/p/-what-is-a-dao-and-what-is-it-for>

Read: Bellavitis C, Fisch C and Momtaz PP (2023) The rise of decentralized autonomous organizations (DAOs): a first empirical glimpse. *Venture Capital* 25(2). Routledge: 187–203.

Lecture 7: Decentralized Finance (DeFi)

Next our attention is on the rise of Decentralised Finance (DeFi) and how it allows users to engage in permissionless peer-to-peer (P2P) finance, but often at great risk.

Watch: *What is DeFi? Decentralized Finance Explained (Ethereum, MakerDAO, Compound, Uniswap, Kyber)* (2020). Available at: <https://www.youtube.com/watch?v=k9HYC0EJU6E>

Read: Dylan-Ennis P (Forthcoming) *The Absolute Essentials of Ethereum*. London: Routledge. Chapter 6. PDF will be provided.

Lecture 8: Non-Fungible Tokens (NFTs)

We take a tour of the world of Non-Fungible Token (NFT) blockchain art and what attracts users to this blockchain subculture.

Watch: *What is an NFT? (Non-Fungible Tokens Explained)* (2021). Available at: <https://www.youtube.com/watch?v=4dk15O9LOKg>

Read: Ali O, Momin M, Shrestha A, et al. (2023) A review of the key challenges of non-fungible tokens. *Technological Forecasting and Social Change* 187: 122248.

Lecture 9: Open Topic based on current events.

Assessment strategy

The assessment breaks down as follows. You can find more details under *Module Information* in Brightspace. There is a mini-lecture there containing all the information you need as well.

Media Analysis, 40%

You will be asked to analyse and critique a set of real media articles based on your understanding of blockchains to date.

Learning Journal and Case Study, 60%

Throughout the class you will keep a learning journal and then at the end of the module you will be presented with a case study to respond to, using material from your journal. Your job will be to respond to the case as if you were really an employee, developer or DAO workstream member.

Assessment Criteria and Grade Descriptors

This module utilises *criterion referencing*:

<https://www.ucd.ie/teaching/resources/assessmentfeedback/howdoigradestudents/>

Before attempting the assessment for this module, you are encouraged to review the *grade descriptors*: <https://www.ucd.ie/history/t4media/UCD%20Module%20Grade%20Descriptors-1.pdf>

You can see the *specific* assessment criteria for the Short Report and Long Essay in Brightspace under *Assessment Information*.

Protocol for submitting your assignments: All continuous assessment should be submitted electronically via Brightspace, by the deadline specified.

University Policies

You should ensure you are familiar with the following UCD protocols:

Plagiarism and Academic Integrity: UCD and the College of Business take academic integrity extremely seriously. All work must be your own, be completed specifically for this module and not have been submitted elsewhere. It should also be accompanied by a signed own work statement, such as the following:

I declare that all materials included in this essay/report/project/dissertation is the end result of my own work and that due acknowledgement have been given in the bibliography and references to ALL sources be they printed, electronic or personal.

The University's plagiarism and academic integrity policy is available from:
<https://www.ucd.ie/secca/studentconduct/>

Harvard Referencing Style: UCD College of Business uses the Harvard style of referencing. The UCD library has developed some resources on avoiding plagiarism and on how to reference correctly using the Harvard style. These resources are available from:
<https://libguides.ucd.ie/academicintegrity>

Late Submission of Coursework: This policy outlines the steps you should take where you know in advance that you will not be in a position to meet a submission deadline and the penalties imposed in such circumstances. See https://www.ucd.ie/t4cms/latesub_po.pdf

UCD Extenuating Circumstances policy: If, during the course of this module, you encounter any serious unforeseen circumstances that are beyond your control and which prevent you from meeting the requirements of the module, you should consult this policy. A student guide to this policy is available from: <https://www.ucd.ie/students/studentdesk/extenuatingcircumstances/>

UCD Student Code: The UCD Student Code establishes the University's regulations and expectations in respect of student behaviour and conduct. The Student Code is available from:
<https://www.ucd.ie/secca/studentconduct/>

Statement of Inclusion

This module strives to be a model of inclusion. We respect and value student diversity in all of the modules we offer. We aim to provide and promote equitable access and opportunity to all students regardless of disability, race, age, gender, sexuality or socio-economic status. Students are encouraged to approach staff to discuss their learning needs. Any information disclosed will be treated confidentially.