

Course Outline

Programme : Undergraduate
Module Code : FIN 4724
Module Title : Economics of Blockchain, AI and Decentralized Finance
Class Date : From 13/8/2026 To 12/11/2026
Semester : Semester 1 Academic Year 2026/2027
Faculty : Edward Tay
Designation : Adjunct Associate Professor
Department : Finance
Classroom : Wednesdays 12-3pm, BIZ1 #03-05
Student hours : Friday 9-11am, BIZ2 #02-13
Email : ed.tay@nus.edu.sg

Overview

This course introduces students to non-technical fundamentals and economics of digital assets, AI and blockchain. The goal of the course is to provide students with a set of skills to understand the foundations and concepts of the blockchain technology and AI which underlies digital assets and its applications in finance. We will invite industry experts to and interact with students and give guest lectures on the real-world applications.

Course Objectives & Learning Outcomes

This course empowers students with the understanding of digital assets, AI and blockchain, as well as their applications in the finance industry and decentralized finance. Students will achieve following intended learning outcomes through lectures, discussions, case studies, self-directed learning, guest lecture(s), and project:

1. To learn & evaluate different AI & blockchain technology and apply with understanding to comprehend & utilize economic frameworks to gain deep insights of non-technical fundamentals of digital assets, AI, blockchain applications in finance, and decentralized finance (DeFi).
2. To critically review research materials and industry practices and evaluate non-technical economic fundamentals of digital assets, AI, blockchain applications in finance, and decentralized finance (DeFi).
3. To independently design and use AI tools to review, evaluate the different risks and rewards and business architecture in digital assets and decentralized finance.
4. To innovate & use AI tools effectively to actively communicate with the industry practitioners and demonstrate the mastery of business terminology in digital assets and decentralized finance.

Please note that the course is focused on non-technical understanding of how blockchain, AI, digital assets, and decentralized finance can help improve business. It will cover the most recent ideas, techniques, and trends in blockchain, AI, digital assets, and decentralized finance.

This is a course for business students. The course will not cover in depth every topic introduced in the lectures. It lays a foundation on which students can build further via more reading on their own.

Assessment

The final course grade will be computed based on the following weights:

Assessment Components	Weight
In-class participation	20%
MCQ Quizzes (5% each)	10%
Test 1	15%

Test 2	25%
Self-directed mini research project	10%
Team project	15%
Post-semester reflection	5%
Total	100%

In-class participation:

In-class participation grades will be allocated based on quality of participation. In evaluating class participation, I will look for comments that are thoughtful and lead the discussion forward.

Quizzes

Quizzes at the end of the class are designed to check your understanding, reinforce learning and areas for improvement. These quizzes will give you instant feedback & help you recall important concepts.

Self-directed mini research project

Self-directed mini project lets you take the lead. In this project, you will choose Initial Coin Offering (ICO) (Utility/Protocol Tokens) apply and use AI tools to help you research, plan, and identify a meaningful ICO.

Tests

Closed-book tests will consist of multiple-choice questions and will cover all assigned readings and problems as well as material covered and discussed in class.

Team project

You will be assigned to a team of 3-6 students to identify, analyze, and present **finance-related real-world application of blockchain**. The objective is to investigate and critique one application that is already existing, being developed, or proposed in the real world by a specific company and is finance related.

Presentations are graded based on the following equally-weighted criteria: quality of research and analysis, clarity of presentations (including visuals), and ability to clearly answer questions.

Presentations will be graded as a team (not individually).

Post-Semester Reflection

Post-segment summary is a one-page reflection on the key learning points from the course and how these insights may influence your work and decision-making going forward.

The main objective is to reflect thoughtfully on what was most meaningful, surprising, applicable, or transformative for you personally and professionally.

Schedule and Outline:

Lecture	Topics	Required readings and submissions	Supplementary readings
1 – Aug 13	Syllabus / Outline History of Money		DeFi and the Future of Finance, Ch. II
2 – Aug 20	Fundamentals of AI and Cryptocurrencies		The AI Book: The Artificial Intelligence Handbook for Investors, Entrepreneurs, and FinTech Visionaries, Wiley. Ch 1-6
3 – Aug 27	Fundamentals of Blockchain and Cryptocurrencies	30min MCQ Quiz in Examsoft (5%) Learning Outcome 1 & 2.	<i>An Introduction to Blockchain, (Ivey Publishing) UVA-F-1810</i> DeFi and the Future of Finance, Ch. II and Ch. III Cryptoassets, Ch. 1-3
4 – Sept 3	Multifactor Models of Risk and Returns Risk and Returns of Crypto Assets I		Liu and Tsyvinsky (2021) Risks and Returns of Cryptocurrency
5 – Sept 10	Risk and Returns of Crypto Assets II	30min MCQ Quiz in Examsoft (5%) Learning Outcome 1& 2.	Liu et al (2022) Common Risk Factors in Cryptocurrency Liu et al (wp, 2022) Accounting for Cryptocurrency Value Cong et al (wp, 2022) Value Premium, Network Adoption, and Factor Pricing of Crypto Assets
6 – Sept 17	Test 1 AI Applications in DeFi.	Test 1: 1hr Open Ended Short Essay in Examsoft. (15%) Learning Outcome 1,2 & 3.	Co-Intelligence: Living and Working with AI, Wharton School. (Ethan Mollick)
Recess Week / September 19 – September 27			
7 – Oct 1	Individual project proposal	Self-Direct Mini Research Project (10%). An Independently Research & Written Submission on a strictly individual basis.	

		Learning Outcome 1,2 & 3.	
8 – Oct 8	Stablecoins, CBDCs and Monetary Policy		Behind the Scenes of Central Bank Digital Currencies, IMF FinTech Notes
9 – Oct 15 (Self-learning week)	ICOs and Raising Capital		Cryptoassets, Ch. 16 Lyandres et al (2021) Initial Coin Offerings: A Review
10 – Oct 22	Tokenization	Deadline for Group Presentation Proposal.	Digital Asset Tokenisation in Asia Pacific (Kapron / Chintai)
11 – Oct 29	Team Consultations	Post Semester Reflection Essay in Examsoft. (5%) Learning Outcome 1,2,3 & 4.	
12 – Nov 5	Team Presentations	Group Presentation (15%). This is a group-based project. Learning Outcome 1,2,3 & 4.	
13 – Nov 12	Test 2 AI Applications in Digital Assets.	Test 2: 1hr Closed Ended Short Essay in Examsoft. (25%). Learning Outcome 1,2,3 & 4.	
		In-Class Participation. (20%). Learning Outcome 1,2,3 & 4. Grades provided by lecturer based on individual performance in class.	

Post-COURSE Continuing Learning (Additional topics for advanced students)

	Accounting for Cryptocurrency	Anderson, Fang, Moon, and Shipman (2025) Accounting for Cryptocurrencies Fang and Huang (2025) Scoping the Frontier: Accounting Research on Cryptocurrency and Blockchain
	Multifactor Models of Risk and Returns Risk and Returns of Crypto Assets	Liu and Tsyvinsky (2021) Risks and Returns of Cryptocurrency Liu et al (2022) Common Risk Factors in Cryptocurrency Liu et al (wp, 2022) Accounting for Cryptocurrency Value Cong et al (2022) Value Premium, Network Adoption, and Factor Pricing Of Crypto Assets <i>Case study: Bitcoin's Rollercoaster Risk and Returns: Sharp(e) Analysis</i>
	Crypto Valuation	Catalini and Wu (2023) Do Crypto Prices Actually Mean Anything? HBR, January Harvey et al (2023) Investors' Guide to Crypto Liu et al (2024) Technology and Cryptocurrency Valuation Catalini and Gans (2023) Initial Coin Offerings and the Value of Crypto Tokens Pagnotta and Buraschi (2021) An Equilibrium Valuation of Bitcoin and Decentralized Network Assets
	DeFi Option Vaults (DOVs)	An Explanation of DeFi Options Vaults (DOVs), QCP Capital, 2021 Best Practices for Building Decentralized Option Vaults - Pt 1, Paradigm Insights, 2022 The Inner Workings of DeFi Option Vaults (DOVs), Delphi Digital, 2022 DeFi Option Vaults Risks and Rewards in a Convex World, Two Prime, 2022
	DeFi Risks	DeFi and the Future of Finance, Ch. VII Harvey and Rabetti (2023) International Business and Decentralized Finance

READINGS

Required Book

- Cam Harvey et al., **DeFi and the Future of Finance** (2021)
- Ajay Agrawal, Joshua Gans, and Avi Goldfarb, **Power and Prediction: The Disruptive Economics of Artificial Intelligence**, Harvard Business Review Press.

Introductory Materials and Non-Technical Short Videos:

- [Explain Bitcoin Like I'm Five](#)
- [Blockchain explained](#) [6 minutes]
- [The Essence of How Bitcoin Works](#) [5 minutes]
- [Introduction to Bitcoin](#) [37 minutes]
- [Warren Buffett: Bitcoin Is An Asset That Creates Nothing | CNBC](#) [6 minutes]
- [Chamath Palihapitiya: I Am A Buffett 'Disciple' But He's Wrong About Bitcoin | CNBC](#) [5 minutes]

Required Technical Notes

- An Introduction to Blockchain, UVA-F-1810
- A Note on Tokenization and Tokenized Assets, Ivey W36668
- A Note on Stablecoins, Ivey W37535
- Decentralized Finance, UVAF2081

Technical videos

- [How Bitcoin Works Under the Hood](#) [22 minutes]
- [How Bitcoin Works in 5 Minutes](#) [5 minutes]
- [Ever wonder how Bitcoin \(and other cryptocurrencies\) actually work?](#) [26 minutes]

Additional Books

- Chris Bruniske and Jack Tatar, **Cryptoassets: The Innovative Investor's Guide to Bitcoin and Beyond** (2017)
- Arvind Narayanan et al., **Bitcoin and Cryptocurrency Technologies**, (2016).
 - a) A full pre-publication draft can be downloaded for free: https://d28rh4a8wq0iu5.cloudfront.net/bitcointech/readings/princeton_bitcoin_book.pdf
- Alex Tapscott, **Web3: Charting the Internet's Next Economic and Cultural Frontier**, (2023)
- Ivana Bartoletti, Anne Leslie, and Shân M. Millie, **The AI Book: The Artificial Intelligence Handbook for Investors, Entrepreneurs, and FinTech Visionaries**, Wiley.
- Ethan Mollick, **Co-Intelligence: Living and Working with AI**, Wharton School.

Additional case studies (most available on Ivey Publishing)

- An Introduction to Blockchain, UVA-F-1810
- The Economics of Cryptocurrency, UVA-GEM-0190
- Bitcoin: Investment or Illusion, UVA-F-1819
- Getting Rich on Crypto, Ivey UVAQA0897
- The DAO Hack: A Blockchain Dilemma, Ivey 9B20E017
- Visa Inc.: Threat from Cryptocurrency? Ivey 9B20M038
- Filecoin's ICO, ABCC-2018-014
- Digital Dollars, UVAGEM0197
- Tezos: Governance in the Cryptocurrency World, F&A0549
- China Merchants Bank: Light Banking, Payments and Blockchain, Ivey 9B20N024
- R3 Corda: A Distributed Ledger Technology for Financial Services, Ivey
- TokenFunder: Democratizing Funding and Investing with Blockchain, Ivey 9B18M186

- Terra and Luna(cy): The Tale of a Stablecoin
- A Note on China's Approach to Cryptocurrency and Blockchain Application in the Games Industry: Coco Game Currency, Ivey 9B20M071
- Dianrong: Marketplace Lending, Blockchain, and "The New Finance" in China, HBP 218043-PDF-ENG
- fidentiaX: The Tradable Insurance Marketplace on Blockchain, HBP 219116-PDF-ENG
- Fluidity: The Tokenization of Real Estate Assets, HPB 219057-PDF-ENG

Additional readings

- Behind the Cryptomania, the Secret Sauce is Blockchain Technology
- Deciphering the cryptic world of Initial Coin Offerings
- How Can Initial Coin Offerings Reinvent Themselves?
- Can Security Token Offerings Save Crypto Fundraising?
- Distributed ledger technology in payment, clearing and settlement: An analytical framework, BIS
- G7 Working Group on Stablecoins: Investigating the impact of global stablecoins
- Behind the Scenes of Central Bank Digital Currencies, IMF FinTech Notes
- Centralized Money in a Decentralized World
- How China's Digital Currency and Facebook's Libra impact monetary policies
- The Transformative Nature of Blockchain-Based Smart Contracts
- Tokenization: Merging of traditional and digital finance
- Navigating the Next Wave of Blockchain Innovation: Smart Contracts
- Decentralized Finance in a Centralized World
- Blockchain and the Decentralization Revolution, JPMorgan, 2018

Additional papers for advanced students (most available on SSRN or Google Scholar)

- Nick Szabo, The idea of smart contracts, 1997
- Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System, 2009
- E Lyandres, B Palazzo, D Rabetti, ICO success and post-ICO performance, Management Science, 2021
- Y Liu, A Tsyvinski, X Wu, Common risk factors in cryptocurrency, The Journal of Finance 77 (2), 1133-1177, 2022
- Y Liu, A Tsyvinski, Risks and returns of cryptocurrency, The Review of Financial Studies 34 (6), 2689-2727, 2021
- I Makarov, A Schoar, Cryptocurrencies and Decentralized Finance (DeFi), NBER, 2022
- J Lee, CA Parlour, Consumers as financiers: Consumer surplus, crowdfunding, and Initial Coin Offerings, The Review of Financial Studies 35 (3), 1105-1140, 2022
- J Lee, CA Parlour, U Rajan, An Introduction to Cryptocurrencies, The Palgrave Handbook of Technological Finance, 79-93, 2021
- AS Hu, CA Parlour, U Rajan, Cryptocurrencies: Stylized facts on a new investible instrument, Financial Management 48 (4), 1049-1068, 165, 2019
- Liu, Tsyvinsky, and Wu, Accounting for Cryptocurrency Value, (wp, 2022)
- Cong, Karolyi, Tang, and Zhao, Value Premium, Network Adoption, and Factor Pricing of Crypto Assets, (wp, 2022)
- Shams, The Structure of Cryptocurrency Returns, (wp, 2022)
- Catalini and Wu, Do Crypto Prices Actually Mean Anything? HBR, January, 2023
- Harvey et al, Investors' Guide to Crypto
- Cong, Lin; Li, Ye; Wang, Neng, Tokenomics: Dynamic Adoption and Valuation, Review of Financial Studies. 34.3 (2021): 1105-1155
- Cong, Lin; Li, Ye; Wang, Neng, Token-based Platform Finance, Journal of Financial Economics, 2022, 144(3), pp. 972-991.
- Cong, Lin; Yizhou Xiao, Information Cascades and Threshold Implementation: Theory and an Application to Crowdfunding, Journal of Finance, 2022

- Liu et al, Technology and Cryptocurrency Valuation: Evidence from Machine Learning, 2022

Academic Honesty & Plagiarism

Academic integrity and honesty is essential for the pursuit and acquisition of knowledge. The University and School expect every student to uphold academic integrity & honesty at all times. Academic dishonesty is any misrepresentation with the intent to deceive, or failure to acknowledge the source, or falsification of information, or inaccuracy of statements, or cheating at examinations/tests, or inappropriate use of resources.

Plagiarism is 'the practice of taking someone else's work or ideas and passing them off as one's own' (The New Oxford Dictionary of English). The University and School will not condone plagiarism.

Artificial Intelligence (AI) tools such as ChatGPT do not require specialist knowledge to use. Many of these AI tools are commonly used in social media, for example, to create content and disguise and refine content created from programmes like ChatGPT. We understand that students will be drawn to using these AI Tools, as they would for any other electronic aid.

However, to be clear, normal academic rules still apply. As noted in the Code of Student Conduct:

"The University takes a strict view of cheating in any form, deceptive fabrication, plagiarism and violation of intellectual property and copyright laws. Any student who is found to have engaged in such misconduct is subject to disciplinary action by the University."

With respect to AI tools (e.g., ChatGPT and image generation tools), your instructor will clarify whether the use of these tools as inputs into your assignment development process is acceptable. AI is a technology that requires skill to use, and knowledge about when and how to use it. If you use ChatGPT or any other such AI tool in your work, you must provide a proper representation of how you used the tool and what prompts you used to generate output. Failure to cite its use constitutes academic misconduct.

Further, as with any information source, be aware that minimal efforts yield low quality results. You will need to refine your work and fact check the output, as you would double-check information from any source. Further, you should be selective in how and when you use such tools instead of using it for each and every assignment you create.

To summarise:

1. Always check with your instructors on what are the permitted uses of AI tools.
2. Have a discussion at the start of a course about the use of AI.
3. Where permitted, acknowledge your use of AI.
4. You remain responsible for the quality of your work and its appropriate representation.
5. Failure to follow the above steps can lead to a concern about plagiarism (academic dishonesty).

As always, you have the obligation to make clear to the assessor which is your own work, and which is the work of others. Otherwise, your assessor is entitled to assume that everything being presented for assessment is entirely your own work.

Additional Guidance:

Admission Condition: <http://www.nus.edu.sg/registrar/administrative-policies-procedures/acceptance-record#NUSCodeofStudentConduct>

NUS Code of Student Conduct: <http://nus.edu.sg/osa/resources/code-of-student-conduct>

Academic Integrity Essentials: <https://libguides.nus.edu.sg/new2nus/acadintegrity#s-lib-ctab-22144949-4>

Guidelines on the Use of AI Tools For Academic

Work: <https://libguides.nus.edu.sg/new2nus/acadintegrity#s-lib-ctab-22144949-3>