DSME6683I Blockchain and its Application *Course Syllabus Term 3, 2022/23* Decision Sciences and Managerial Economics CUHK Business School

Instructor: Office: E-mail: Office hours:	Prof. KIM Keongtae CYT 908 keongkim@cuhk.edu.hk by Appointment	
Class time:	Fri from 6:45pm to 09:30pm	
Class Schedule:	Refer to the detailed course schedule on Page 4	

Course materials:

- 1. Optional books:
 - a. *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction,* by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Princeton University Press, 2016 (a free pre-publication version of the book available online)
 - b. *Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum, and more,* 3e, by Imran Bashir. Packt Publishing, 2020
 - c. *Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World,* 1e, by Don Tapscott and Alex Tapscott. Portfolio Penguin, 2016
 - d. *Blockchain and the Law: The Rule of Code,* by Primavera De Filippi and Aaron Wright. Harvard University Press. 2019.
- 2. Cases and other types of reading materials.

Course description:

Blockchain technology provides a dynamic shared ledger that enables peer-to-peer transfer of digital assets without any intermediaries, and is predicted to be a revolutionary technology that is just as impactful as the Internet. It is radically transforming financial services, supply chains, and other business services, as well as creating new opportunities for innovation.

This course aims to provide students with basic knowledge of Blockchain and its practical applications in various business fields. It introduces the basic concepts and technologies of Blockchain with the technology's initial application, the cryptocurrency Bitcoin. Students will then gain an understanding of the commercial, technical, and public policy fundamentals of Blockchain technology and smart contracts in both public and private applications. Finally, the class will discuss current and potential Blockchain applications in various business domains.

Course goals:

Upon successful completion of this course, students should:

- Understand the basic concepts and technologies of the blockchain
- Understand examples of Blockchain networks, both public and private
- Understand the capabilities and limitations of blockchain technology
- Understand and evaluate various blockchain applications such as cryptocurrencies, ICOs, DeFi, and NFT

Grading

Evaluation Items	Percentage
Case Analysis	30%
(Individual) Case Summaries (3 Cases)	21 %
(Group) Case Presentation	9%
Group Project	30%
Proposal	5%
Final Report	18%
Final Presentation	7%
Exam	20%
Class Participation	20%
Total	100%

Grade Descriptors

А	Outstanding performance on all learning outcomes.		
A-	Generally outstanding performance on all (or almost all) learning outcomes.		
В	Substantial performance on all learning outcomes, OR high performance on some learning outcomes which compensates for less satisfactory performance on others, resulting in overall substantial performance.		
С	Satisfactory performance on the majority of learning outcomes, possibly with a few weaknesses.		
D	Barely satisfactory performance on a number of learning outcomes.		
F	Unsatisfactory performance on a number of learning outcomes, OR failure to meet specified assessment requirements.		

Group Project:

The details of project deadlines and requirements will be available in a separate document provided to the students. The goal of this project is to critically evaluate one interesting startup in the blockchain domain and its business model. At the end of the semester, the final deliverable of this project is a project report and a presentation given by each group. If the project is not completed by the final deadline, students will be evaluated on their progress and on the deliverables that have been submitted prior to this deadline.

Case Analysis:

1. Group assignment: Your group will be required to analyze a blockchain case which will be assigned in the class and submit a case analysis PPT report. Your team will be also asked to prepare for a presentation in class. The details of project deadlines and requirements will be available in a separate document provided to the students.

2. Individual assignment: Each student should submit 2-pages summary reports of each case except the presenting case before the class. The details of project deadlines and requirements will be available in a separate document provided to the students. "Turn-around time" shall be 2-4 weeks from the assignment submission deadline.

Exam:

You will be tested over all materials covered in the lectures before the exam. No make-up exam will be arranged, except for serious illness and serious weather conditions. Please refer any special case, such as absent in exam, absent for lessons for long period of time etc. to Program Office at once for follow up.

Class Participation:

Students are required to have <u>at least 70% attendance</u> in this course. Please make an effort to attend every class. Also, every class participation will be counted and graded.

Class policies:

1. **Statement Regarding Email as Official Means of Communication**: Each student must have an email address to be able to communicate with the professor, the TA, and students in the group or the class.

2. Blackboard: The class will also rely heavily on Blackboard for class communication, material distribution and discussion. It is important for you to visit Blackboard for class information.

3. Class Preparation. All students are expected to be prepared for class. Each student is responsible for all materials covered and assignments made in class and the instructor will make no special efforts on behalf of those who voluntarily miss classes. All students are encouraged to contribute toward the success of the course by sharing their knowledge and opinions in class, including bringing pertinent materials and experience to the attention of the instructor and the class. Students will also be called to answer questions and discuss problems.

4. Late Submission:

- All assignments must be completed and submitted according to the instructions provided.
- Hardware failure or inaccessibility is not a valid excuse for late work. This means that if the computer eats your assignment, or if the labs are full, you will not be excused from handing in an assignment on time.

5. Academic Honesty: Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at http://www.cuhk.edu.hk/policy/academichonesty/.

- In the case of group projects, all members of the group should be asked to sign the declaration, each of whom is responsible and liable to disciplinary actions, irrespective of whether he/she has signed the declaration and whether he/she has contributed, directly or indirectly, to the problematic contents.
- For assignments in the form of a computer-generated document that is principally text-based and submitted via VeriGuide, the statement, in the form of a receipt, will be issued by the system upon students' uploading of the soft copy of the assignment

6. Changes in the Syllabus: The professor reserves the right to improve the materials and requirements as the semester unfolds, with sufficient warning concerning assessments, exams, and assignments.

7. Special Needs: If you have any special learning or testing requirements please let me know as soon as possible so special arrangements can be made. If you have any special medical condition (e.g., epilepsy) that you feel it would be helpful for me to know about, please let me know. If you have any special needs in terms of evacuating the building in case of an emergency, please also let me know.

DSME6683I Tentative Course Schedule – Term 3 2022/23

Date	Class #	Торіс	Assignment/note
10/3	1	Course Introduction Introduction to Digital Technologies Basics of Blockchain	
17/3	2	Basics of Blockchain and Bitcoin	
24/3	3	Ethereum Blockchain, Smart Contract, and DAO	
31/3	4	Challenges in Blockchain	Case 1
7/4			
14/4	5	Permissioned Blockchain	Case 2 & Guest talk
21/4	6	Blockchain Economics & Initial Coin Offering (ICO)	
28/4	7	Dapps and Decentralized Finance (DeFi)	Guest talk
5/5	8	StableCoin and Central Bank Digital Currency (CBDC)	Case 3
12/5	9	Supply Chain	Case 4
17/5 (Wed)	10	Non-fungible Token (NFT)	Guest talk
2/6	11	Group project presentation	Final Report (5 Jun)
9/6	12	Exam	

This is a tentative schedule. Dates and topics of lecture are subject to change.

The deadline of each case summary report is before the class. The other submissions are due 11:59pm.

Class 1 (Mar 10): Introduction to Digital Technologies and their Business Application

https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/the-top-trends-in-tech

Haeringer, G. & Halaburda, H. (2018). <u>Bitcoin: A Revolution?</u> in Economic analysis of the digital revolution, Ganuza, J. & Llobert, G., (eds), FUNCAS

Andreessen, M. (2014). Why Bitcoin Matters. New York Times.

(Optional) https://www.cbinsights.com/research/report/blockchain-trends-2022/

(Optional) https://www2.deloitte.com/us/en/insights/focus/tech-trends/2022/blockchain-trends.html

(Optional) Surowiecki, J. (2012). <u>A Brief History of Money</u>. IEEE Spectrum.

(Optional) Smith, N. (2021). Interview: Marc Andreesen, VC and tech pioneer.

Class 2 (Mar 17): Basics of Blockchain and Bitcoin

Haeringer, G. & Halaburda, H. (2018). <u>Bitcoin: A Revolution?</u> in Economic analysis of the digital revolution, Ganuza, J. & Llobert, G., (eds), FUNCAS

Narayanan, A. & Clark, J. (2017). Bitcoin's Academic Pedigree. ACM Queue.

Seth (2021). How Do Cryptocurrency Mining Pools Work? Investopedia.

(**Optional**) Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction* (**Chapters 1-5**), Princeton University Press.

(Optional) Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Unpublished.

(Optional) Talyor (2017). The Evolution of Bitcoin Hardware. IEEE Computer.

(Optional) Frankek, J. (2018). Valuing Bitcoin and Ethereum with Metcalfe's Law. Medium.

Class 3 (Mar 24): Ethereum Blockchain, Smart Contract, and DAO

Halaburda, H., Sarvary, M., & Haeringer, G. (2021). <u>Beyond Bitcoin: The Economics of Digital Currencies and</u> <u>Blockchain Technologies</u> (Only Sections 5.1 & 5.2), *SSRN*.

What is Ethereum? Coinbase. (2021).

Baggetta, M. (2021). Ethereum Vs Bitcoin: What's the Difference? Blockgeeks.

Qadir, S. (2021). DAOs Decentralized Autonomous Organizations. Galaxy Digital Research.

(Optional) Bashir, I. (2020). *Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum, and more* **(Chapters 11-12)**. Packt Publishing,

(Optional) Ethereum Whitepaper. Ethereum. (2022).

(Optional) Orcutt, M. (2018). Ethereum's Smart Contracts are Full of Holes. MIT Technology Review.

(Optional) Entering the Monolith: Ethereum's Gas Fees Explained. Monolith. (2021)

Class 4 (Mar 31): Challenges in Blockchain

Tucker, C. & Catalini, C. (2018). What Blockchain Can't Do. Harvard Business Review.

Tomaino, N. (2018). On the Scalability of Blockchains.

Barber, G. (2019). What's Blockchain Actually Good for, Anyway? For Now, Not Much. Wired.

Beckett, A. (2021). What is a Blockchain Oracle? Medium.

[Case 1] Yoffie , D.B. & Gonzalez, G. (2020). Ripple: The Business of Crypto. Harvard Business Case 719-506.

(Optional) Bashir, I. (2020). *Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum, and more* **(Chapter 13)**. Packt Publishing,

(Optional) On Sharding Blockchains FAQ. Ethereum Wiki.

Class 5 (Apr 14): Permissioned Blockchain

GmbH, M. (2018). Technical Difference Between Ethereum, Hyperledger Fabric and R3 Corda. Medium.

[Case 2] King, M.R. (2018). R3 Corda: A Distributed Ledger Technology for Financial Services. *Ivey Business Case* W18592.

(Optional) Enterprise's Blockchain - A Comprehensive Overview. (2021). Blockdata.

Class 6 (Apr 21): Blockchain Economics & Initial Coin Offering (ICO)

Catalini, C. & Gans, J.S. (2020). Some Simple Economics of the Blockchain. CACM

Crypto Tokens: A Breakthrough in Open Network Design. (2017). Cdixon.

Singh, S. (2021). Crypto & NFTs: Network Effects in Web3. Breadcrumb.vc.

Mulders, M. (2020). 10 Keys for Evaluating Initial Coin Offering (ICO) Investments. Cryptopotato.

Bussgang, J. (2017). The Summer of ICOs: VC Implications. Medium.

Class 7 (Apr 28): Dapps & Decentralized Finance (DeFi)

Di Maggio, M., Platias, N., Sha, W., & Andreoulis, N. (2021). What Happens When Cryptocurrencies Earn Interest. *Harvard Business Review*.

Decentralized Finance (DeFi) - A New Fintech Revolution? The Blockchain trend Explained. (2020). BitKom.

DeFi Beyond the Hype: The Emerging World of Decentralized Finance. (2021). Produced by the Wharton Blockchain and Digital Asset Project, in collaboration with the World Economic Forum.

Hertig, A. (2022). What is DeFi? CoinDesk.

(Optional) Bashir, I. (2020). Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart

Contracts, DApps, Cryptocurrencies, Ethereum, and more (Chapter 18). Packt Publishing,

Class 8 (May 5): StableCoin & Central Bank Digital Currency (CBDC)

Catalini, C. & Massari, J. (2021). Stablecoins and the Future of Money. Harvard Business Review.

Pauw, C. (2018). Stable Coins Analysis: Is There a Viable Solution for the Future? Cointelegraph.

Lopatto, E. (2021). The Tether Controversy, Explained. The Verge.

e-HKD: A Policy and Design Perspective. HKMA (2022).

[Case 3] Di Maggio, M., Rouen, E., Serarfeim, G., & Sesia, A. (2021). Facebook's Libra: The Privatization of Money? *Harvard Business Case* 120-021.

(Optional) e-HKD: A Technical Perspective. HKMA (2021).

(Optional) <u>Progress of Research & Development of E-CNY in China</u>. Working Group on E-CNY Research and Development of the People's Bank of China. (2021).

(Optional) Haun, K., Tillemann, T., & Rathmell, J. Stablecoins, Stability, and Financial Inclusion.

(Optional) Catalini, C. & de Gortari, A. (2021) On the Economic Design of Stablecoins. SSRN

Class 9 (May 12): Supply Chain

Vitasek, K., Bayliss, J., Owen, L., & Srivastava, N. (2022). <u>How Walmart Canada Uses Blockchain to Solve Supply-Chain</u> <u>Challenges</u>. *Harvard Business Review*.

Lumineau, F., Wang, W., Schilke, O., & Huang, L. (2021). How Blockchain Can Simplify Partnerships. *Harvard Business Review*.

Turns, A. (2021). Hook to Plate: How Blockchain Tech Could Turn the Tide for Sustainable Fishing. The Guardian.

Hill, R. (2018). IBM Struggles to Sign up Shipping Carriers to Blockchain Supply Chain Platform. The Register.

[Case 4] Poon, K., Pun, H., Liang, J., & Chen, J. (2020). Chow Tai Fook: Blockchain for the Diamond Industry. *Ivey Business Case W20143*.

Class 10 (May 17): Non-Fungible Token (NFT)

Clark, M. (2021). NFTs, explained. The Verge.

https://ethereum.org/en/nft/

Atkinson, H. (2021). The Metaverse is Coming, Companies need to Prepare. CoinDesk

(Optional) Baucherel, K. (2020). Digital Cats Will Change the World. Business Expert Press.

(Optional) EIP-721: Non-Fungible Token Standard. Ethereum Improvement Proposal. (2018).

(Optional) EIP-1155: Multi Token Standard. Ethereum Improvement Proposal. (2018).

(Optional) Reiff, N. (2022). What is ERC-20 and What Does It Mean for Ethereum? Investopedia.