Module Outline

Programme : The NUS BBA
Module Code : FIN4126/FIN4721
Module Title : AI, Blockchain and Quantum Computing
Class Date : From 8/8/2020 To 5/12/2020
Semester : Semester 1, Academic Year 2020/2021
Location : BIZ2 B1-04 (Most classes are online with a few that need physical presence)
Faculty : David Lee Kuo Chuen (Guest Lectures to be invited)
Department : Finance
Email : Bizdlkc@nus.edu.sg
Note : Due to the Professor's schedules, more than 50pc of the learning experience will be via zoom and hands-on on the computer.

Overview

The course offers a framework and analysis for the current technology landscape across inclusive financial and insurance sectors as well as emerging technologies such as AI, Blockchain, Cloud & Cyber Security, Data Analytics, Environmental Friendly Technology, Financial Inclusion, 5G and Quantum Computing (ABCDEFG-Q). The students will be able to develop critical views of emergent technologies, upgrade their technology literacy and use new approaches to evaluate inclusive FinTech projects in a trustless world. This course may be conducted 50pc on Zoom even post Covid19.

Module Objectives

By the end of the course, the students are expected to
(1) understand the design thinking behind the technology;
(2) develop the ability to analyse inclusive fintech projects;
(3) comprehend the impact of technology on the society and business models;
(4) acquire technical knowledge to serve the underserved;
(5) Apply the techniques to real-world use cases.

Online Rules and Expectations

1. Students are expected to be actively on the chat while the lecture is in progress via streaming or in person.
2. There will be polls and all students must be present and connected.
3. Videos may be played, and questions will be answered either via chat or a break in the video.
4. The learning experience is peer-to-peer and decentralised so that maximum interaction and sharing among students are expected.
5. Your participation online is essential, even if the class is conducted physically.
6. Unless it is an inconvenience, students webcam is expected to be switched on at all time.

Assessment

Assessment Components	Weightage
Weekly Learning Log and Participation	15
Group Project	30
Mid Term Quiz	30
Final Test	25

Schedule and Outline

Lesson/ Week	Date	Session (lesson summary or outline / learning objectives / preparation / cases & assignments / follow-up readings & resources) There will be guest speaker, handson and/or group discussions every lesson.	References
1	Aug 11 Tuesday 3-6pm	**The Why of Tech in Finance - Overview**: This lesson will give an overview of FinTech including the definitions, the dynamics, the economics, the unbundling and bundling of services, LASIC Model, types of FinTech and digital finance, the disruptive nature, and decentralisation. Case Study: Ant Financial	**IF: C1** **Reading: 1** **Case: 1**
2	Aug 18	**The AI Landscape and FinTech Competition:** US versus China, AI FinTech Machines. **The AI Landscape I and Techniques** Data Structure, Neural Network and Singapore IMDA Plan	**AIQC: C1-4** **AIDB: C1-2** **Demo 1**
3	Aug 25	**The AI Landscape II and Business Applications** K-Mean, K Nearest Neighbours, Deep Learning and Business Applications	**Lecture Notes** **Demo 2 and 3**
4	Sep 1	**The AI Landscape III and Skynet** NLP, Deep Fakes, the importance of Data Privacy Protection, Inclusiveness and Ethics	**Lecture Notes** **Demo 4 and 5**
5	Sep 8	**The Product - Digital Currency, Bitcoin, and Cryptocurrency**: This lesson will cover the topics on Global Financial Crisis, the evolution of digital currency, nature and types of digital currency, eCash and pioneer cryptocurrencies, Bitcoin, mining, security, basic cryptography, payments, the impact of digital currency, risk, returns, complexity, and future of FinTech.	**IF: C2** **Cases: 2**
6	Sep 15	**FinTech Valuation, Token Economics, Crowd Sales and Asset Allocation -** This lesson will cover different methods of valuation and analysis for FinTech projects such as TAM/SAM/SOM, 2Es, 3Cs, 6Ds, 7Ws, LASIC, PESTEL, SWOT, and crypto-token fund-raising methods including the most basic forms (ICO, IEO, STO), definitions, types, risk, returns, complexity, rights, designs, regulation, and other variants of Token Swaps and initial offerings. This lesson also covers the technical and statistical analysis of the drivers of returns, including philosophy, economics, incentives, behaviour, and technology designs for the digital asset class. The challenges of asset allocation decisions	**IF: C3, C4** **Main Reading: 2** **Reading: 4,5,6** **Case: 3**

		of a class of nascent and emerging FinTech engineering products will be discussed.	
7	Sep 29	**The Financial Technology - Blockchain I**: This is the first of two lessons on blockchain. This first lecture covers the cypherpunk's philosophical origin of blockchain, features, applications, government and enterprise perspectives, and use cases.	**HB: C7; IF: C5,6** **AIDB: 3-4**
8	Oct 6	**The Deeper Technology - Blockchain II**: This lesson is a technical introduction to blockchain and covers the characteristics of public, private, consensus algorithms, distributed ledgers, and blockchain cryptography for distribution of trust and protection of privacy. **(Mid-Term 30 Multiple Choice Questions Online Test, Open Book, Open Access in 1.5 hours)**	**HB: C7; IF: C5,6** **AIDB: 3-4**
9	Oct 13	**The Design Thinking – Blockchain III:** This lesson will cover the thinking process for corporate implementation for blockchain. The importance of ideas such as FOMO (Fear of Missing Out), sustainability, inclusive finance will be covered to understand the landscape for blockchain. Guest Speaker: Edwan Chiam, CEO, https://www.hellodime.com/	**HB: C7; IF: C5,6** **AIDB: C3-4** **Reading: 7,8,9,10,11,12,13** **Case: 4**
10	Oct 20	**DCEP, 5G, and the Coin Created by Facebook – Libra:** Analysing Libra Coin with JP Morgan Coin, Goldman Coin, Theta and other Corporate CryptoTokens. The Central Bank Digital Currency – DCEP: Analysing cryptocurrency issued by Government and in particular the Digital Payment and Electronic Payment Currency by the Chinese Government. The landscape in China, FinTech Chip and Cloud Wars: Case study on Huawei and the Global AI Chip War	**Reading: 9 - Paper by Professor to the European Parliament** **AIQC: C7-9, 12** **Case: 5**
11	Oct 27	**Quantum Computing** This lecture covers the potential of Quantum Computing in Finance and Insurance.	**AIQC: C11** **AIDB: C3-4**
12	Nov 3	**Presentations by Students (15 mins per group)**	
13	Nov 10	**Final Test of 25 Online MCQs, Open Book, Open Access in 1 hour.**	

General Guide & Reading

Main Text and Reading

1. "Inclusive FinTech: Blockchain, Cryptocurrency and ICO", David Lee Kuo Chuen and Linda Low, World Scientific. Topics 1 to 6, 8 and 9. (**IF**)
2. "Cryptocurrency: A New Investment Opportunity?" David Lee Kuo Chuen, Li Guo, and Yu Wang, The Journal of Alternative Investments Winter 2018, 20 (3) 16-40; DOI: https://doi.org/10.3905/jai.2018.20.3.016. Topic 7. (**JOAI**)
3. "AI and Quantum Computing for Finance and Insurance", Paul Schulte and David Lee Kuo Chuen, World Scientific. Topics 10, 11, and 12. (**AIQC**)
4. "Artificial Intelligence, Data and Blockchain in a Digital Economy", David Lee Kuo Chuen, World Scientific. Topics 2, 7, 8, and 11. **(AIDB)**

Supplementary Reading

1. "Emergence of FinTech and the LASIC Principles", David Lee Kuo Chuen and Ernie Teo, Journal of Financial Perspectives, Vol. 3, No. 3, 2015 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2668049
2. "Handbook of Blockchain, Digital Finance, and Inclusion: Cryptocurrency, FinTech, InsurTech, and Regulation" David Lee Kuo Chuen, RH Deng – 2018
3. "Handbook of Blockchain, Digital Finance, and Inclusion: ChinaTech, Mobile Security, and Distributed Ledger" David Lee Kuo Chuen, RH Deng – 2018 (**HB**)
4. "Evaluating the Potential of Alternative Cryptocurrencies", B Ong, TM Lee, G Li, David Lee Kuo Chuen - Handbook of digital currency, 2015
5. "Bitcoin IPO, ETF, and Crowdfunding", ND Bhaskar, LP Nian, David Lee Kuo Chuen - Handbook of Digital Currency, 2015
6. "CRypto IndeX", 2015, by Wolfgang Hardle and Team and initiated by David Lee Kuo Chuen, https://thecrix.de/
7. Decentralisation and Distributed Innovation: Fintech, Bitcoin and ICO's, David Lee, 2018, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3107659
8. The New Money: The Utility of Cryptocurrencies and the Need for a New Monetary Policy, David Lee and Ernie Teo, 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3608752
9. Blockchain Use Cases for Inclusive FinTech: Scalability, Privacy, and Trust Distribution, David Lee and Caroline Lim, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3629135
10. Fintech Tsunami: Blockchain as the Driver of the Fourth Industrial Revolution, David Lee, 2017, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2998093
11. Libra: It is a fine balance, David Lee and Ernie Teo, 2018, https://jupiterchain.tech/facebook-libra/
12. Blockchain and Inclusion, David Lee, 2018, https://vinaj.com/spotlight-series/interview-with-david-lee-kuo-chuen-professor-of-fintech
13. Digital Economy and Blockchain, David Lee, 2020, http://tfageeks.com/2020/05/31/digital-economy-and-blockchain-professor-david-lee-kuo-chuen-professor-of-finance-programme-singapore-university-of-social-sciences/
14. Other articles and cases assigned

Cases

1. Ant Financial: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3052318
2. Trusted Third Party: https://nakamotoinstitute.org/trusted-third-parties/
3. Social Scalability: http://unenumerated.blogspot.com/2017/02/money-blockchains-and-social-scalability.html
4. Libra 2.0: https://libra.org/en-US/white-paper/
5. Libra Technical Paper: https://developers.libra.org/docs/the-libra-blockchain-paper

Tutorial

Students are to submit a copy of the summary (not more than 150 words of your own) of the discussions and applications of the concepts after each lecture. There will usually be a case study for each lesson and the conclusions and participation are important. The summary/study log (see the template) will have to be submitted latest by the next lecture. The summary/study log is needed for each of the lecture 1-11 and please state clearly on the right-hand top corner that you have been absent for the particular class.

Term Test

There will be an open book term test of 30 multiple-choice questions (1 mark per question) during the 8th lesson.

Group Project

Every group will consist of x (class size/10) students (maximum 10 groups and the groups will be formed on LUMINUS by students by the 2nd lesson), and a PowerPoint Presentation of not more than ten slides are to be presented within 15 minutes during the 12th lesson. An essay of not more than 2000 words is to be submitted together with the PPT slides in hard copy. The research or discussion topic will be chosen by the students on AI, Blockchain and Quantum Computing either taught during the course or beyond. The essay and presentation must apply the concepts taught in the course. All references must be clearly acknowledged including figures, diagrams, pictures, or quotes. All references must be clearly acknowledged, including figures, diagrams, pictures, or quotes. Marks are given for Content (20pc), Analysis (20pc), Original charts, diagrams and figures (50pc), and Conclusion (10pc). The video can be pre-recorded. A proposal of not more 100 words must be submitted to the lecturer on the 8th lesson. Every student is to present in the video or during the 12th lesson. When Group 1 is presenting, Groups 2,3,4 are to comment via the chat. When Group N is presenting, Groups N+1, N+2, N+3 will comment. You can treat the set as a ring so that when Group 10 is presenting, we start with 1+2+3.

(Submission: Softcopy of essay and PPT to be submitted the day before presentation to Bizdlkc@nus.edu.sg)

Final Test

There will be an open book, open access final test of 25 multiple-choice questions (1 mark per question) during the 13th lesson.

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. Students should adopt this rule - 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 being presented as entirely your own work. This is a minimum standard. In case of any doubts, you should consult your instructor.

Additional guidance is available at:

1. http://www.nus.edu.sg/registrar/adminpolicy/acceptance.html#NUSCodeofStudentConduct
2. Online Module on Plagiarism: http://emodule.nus.edu.sg/ac/