北京大学 汇丰商学院 Peking University HSBC Business School

Blockchain and Digital Currency

Block 3, 2018-2019

Course Information

Instructor: Laurence Kirk

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Classes:

Lectures: Mondays 13:00 – 17:00 for 8 weeks

Venue: Online via Zoom

1. Course Description

1.1 Context

Course overview:

This course focuses on the theory and application of distributed ledger technology, with special emphasis on financial applications and digital currencies.

Prerequisites:

None

1.2 Textbooks and Reading Materials

Lecture notes, assignments, cases and other useful information will be posted on the course web page. Other recommended reading will specified during the lectures.

Reference text: Blockchain for Business - Jai Singh Arun

Reference text: Blockchain Basics - Daniel Drescher

Reference text: The Internet of Money - Andreas M. Antonopoulos

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment (Yes with details or No)
1. Understanding decentralisation in systems and its benefits	1.1 The problems facing centralised and decentralised systems	
	1.2 How Distributed ledger technology solved these problems	
	1.3 How blockchains have been used to produce cryptocurrencies.	
2. Understanding Application Blockchains and Smart Contracts	2.1 The potential of smart contracts	
	2.2 The applicability of public and private blockchains	
	2.3 The differences between the major public and private application blockchains	
3. How Blockchains are being used in business	3.1 Decentralised business models.	
	3.2 The blockchain applicability framework.	
	3.3 Blockchain use cases in various domains	
4. The financial applications of blockchains	4.1 Cryptoeconomics	
	4.2 Central Bank Digital Currencies	
	4.3 Decentralised Finance	
5. Blockchain limitations	5.1 Scalability	
	5.2 Privacy and GDPR	
	5.3 Governance	

2.3 Assessment/ Grading Details

Assessment Task	Weighting
Week 4 Short Essay	50%
Week 8 Short Essay	50%
Total	100%

Team Project: None

2.4 Academic Honesty and Plagiarism

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts down by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honours, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

For more information of plagiarism, please refer to PHBS Student Handbook.

3. Topics, Teaching and Assessment Schedule

Week 1

Topic: Introduction to decentralised systems

- **Course Introduction**
- **Decentralised Systems versus Centralised systems**
- **The motivation for blockchain and early history**
- **Blockchain components**

Reading List:

Blockchain Basics - Part 1 and 2

Internet of Money Chapter 1

The Centre cannot hold

How the Bitcoin protocol actually works

Nakamoto Institute

Double Spending

Week 2

Topic: Application Blockchains

- The Blockchain protocol in detail
- How Ethereum introduced new blockchain capabilities
- Smart contracts
- Alternative private and enterprise blockchain platforms
    - Hyperledger
    - Corda
    - EOS
    - Zilliqa
    - Tezos
    - Dfinity

- Comparison of public and private blockchains

Reading List:

Blockchain Basics - Stage III

Ethereum White Paper

Introduction to Hyperledger

Week 3

Topic: A practical workshop for smart contract development on Ethereum

- The Ethereum Virtual machine
- The solidity programming language
- Integrating smart contracts into a traditional application architecture
- Blockchain security
- Development best practices
- Developer tools

Reading List:

ERC20 Token Standard

Remix Documentation

Solidity Documentation

Week 4

Topic: Blockchains in business

- Decentralised business models
- The blockchain applicability framework
- Enterprise blockchain systems
- Blockchain Use case workshop 1

Reading List:

Blockchain for business chapter 2 and 4

Blockchain challenges and oppurtunities

Week 5

Topic: Blockchain applications in finance

- Cryptoeconomics
- Tokens
- Stablecoins
- Central Bank Digital Currencies
- Decentralised Finance
- Financial Regulation

Reading List:

Blockchain for business chapter 7

Cryptoeconomics

Introduction to cryptoecenomics

Blockchains and Digital Assets

Week 6

Topic: Blockchain use case across business domains

- Insurance
- Supply chains
- Energy
- Healthcare
- Manufacturing
- Decentralised Autonomous Organisations
- Smart cities
- Internet of things and blockchain
- **Blockchain Use case workshop 2**

Reading List:

Blockchain for business chapter 2

A review of blockchain based applications

Week 7

Topic: Blockchain limitations

- Scalability
- Privacy
- Security
- Regulation
- Governance

Reading List:

Blockchain for business chapter 5

Week 8

Topic: Course summary and future trends in blockchain

Associated technology

- Zero knowledge proofs
- Fully homomorphic encryption
- AI and blockchain

Reading List:

A gentle introduction to zero knowledge proofs

Introduction to Homomorphic Encryption