UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
BLOC-511DL	Digital Currency	10
Prerequisites	**Department**	**Semester**
N/A	Digital Innovation	Fall / Spring
Type of Course	**Field**	**Language of Instruction**
Required	Distributed Ledger Technology, Blockchain	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Dr. George Giaglis Industry Fellows: Antonis Polemitis, Andreas Antonopoulos	1st
Mode of Delivery	**Work Placement**	**Corequisites**
Distance Learning	N/A	N/A

Course Objectives:

The course is designed to provide an introductory understanding of decentralized digital currencies (cryptocurrencies) such as bitcoin, a basic understanding of its underlying technology 'Blockchain' and why this new and innovative technology is so important, since it has the potential to disrupt a number of industries in the immediate near future. In particular, the course will survey the theory and principles by which cryptocurrencies operate, practical examples of basic cryptocurrency transactions, the likely interaction of cryptocurrencies with the banking, financial, legal and regulatory systems, and how cryptocurrencies could be viewed within a framework of innovation and development.

The course will consist of four general topics:

1. Theoretical introduction to digital currencies: This will include the history of digital currencies, the invention of decentralized consensus through proof-of-work, and a technical overview of cryptographic currencies such as bitcoin, as well as alternative/advanced uses of the blockchain.

2. Practical introduction to digital currencies: This will include practical, introductory exercises in utilizing and constructing cryptocurrency transactions.

3. Banking, financial and regulatory implications of digital currencies: Overview of how

cryptocurrencies map to the existing monetary and banking system and possible approaches to regulation and development.

4. Innovation & development: How cryptocurrencies can be viewed through innovation frameworks and what possibilities exist for cryptocurrencies to accelerate development

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Understand the technology components of blockchain-based digital currencies, cryptographic functions and hashes, the process of currency issuance and mining, proof-of-work, consensus and distributed ledger technology.

2. Demonstrate an understanding of digital currencies and be able to conduct transactions from a digital currency wallet.

3. Understand more advanced uses of the blockchain such as escrow services, asset registration, attestation and smart contracts, and how it can deployed to a number of industries.

4. Understand alternatives to bitcoin, such as alt-coins, Ethereum and Bitcoin Cash.

5. Understand what parallels and differences cryptocurrencies have with the existing monetary and banking systems.

6. Understand likely frameworks for regulating cryptocurrencies, challenges with current regulatory landscape.

7. Be able to place cryptocurrencies in the context of disruptive innovations and understand their potential for growth or development.

Course Content:

1. **A brief history of money: From sea shells to crypto currency.**
   - Understand the main functions of currency.
   - Main forms of currencies, historical use and evolution over time.
   - Understand how Bitcoin, the most popular cryptocurrency, is designed from from a monetary perspective.

2. **The Byzantine' General's Problem: What is it, why is it important in computing, and**

solutions over time.

- Understand the Byzantine Generals' Problem.
- Recognize centralized asset and transaction ledgers.
- Understand how Bitcoin addresses the Byzantine Generals' Problem (Mining, PoW).
- Review some key Bitcoin metrics.

3. **Basics of Cryptocurrency: Public/private keys, transactions, mining.**

- Go through major events in the history of Bitcoin.
- Understand how Bitcoin and cryptography are related.
- Gain a first idea of how Bitcoin transactions work.
- Get introduced to Bitcoin mining.

4. **Bitcoin in practice – Part 1: Bitcoin, online wallets, sending/receiving, paper wallets/cold storage.**

- Understand the concept of Bitcoin wallets.
- Get an introduction on Bitcoin clients.
- Analyze how a Bitcoin transaction is performed using blockchain.info.
- Learn about the concepts of 'cold storage' and 'paper wallets'.

5. **Bitcoin in practice – Part 2: Bitcoin, constructing a transaction, mining**

- Understand Bitcoin Core and how it works.
- Understand the functionality of Bitcoin Core and exploring transactions.
- Multi-signature transactions, Segregated Witness, Lightning network, Forks.
- Get more familiar with the mining process and mining pools.

6. **Alternative uses of the blockchain: Colored coins, meta-coins, asset registration, attestation, smart contracts, political speech.**

- Understand the original purpose of Blockchain.
- Explore some alternative uses of the blockchain (colored coins, smart contracts, etc).
- Glimpse at possible future uses of the blockchain in various industries.

7. **Alternatives to Bitcoin: Alt-coins; Ripple / IOU Based Systems, Ethereum.**

- Overview of some popular alternative currencies and DLT networks.
- Devise categorization criteria for most popular alt-coins.
- Summary of Key Performance Indicators (KPI's) when assessing alternative digital currencies.
- Permissioned Ledgers, Private Blockchains, Initial Coin Offerings.

8. **Cryptocurrency and Central Banking: Applying the concepts of money supply, fractional reserve banking, monetary policy, fiat/commodity money to cryptocurrencies.**

- Understand the basic functions of Central Banks
- Examine how digital currencies/cryptocurrencies replicate (or not) the functions of Central Banks.
- Examine advantages and disadvantages this creates.
- Understand the public positions of the Federal Reserve Bank and European

Central Bank towards digital currencies.

9. **Cryptocurrency and Financial Institutions: Applying the concepts of exchanges, banks, money transmitters and capital markets to cryptocurrencies.**
   - Briefly summarize existing financial services as an introduction.
   - Explore cryptocurrency financial services at the moment (exchanges, wallets, merchant processing, asset management).
   - Understand the opportunities behind payments as a process with the use of cryptocurrencies.

10. **Regulatory and tax treatment: Potential regulatory and legal frameworks for cryptocurrencies, including classification/recognition, AML, KYC, consumer protection, and taxation.**
   - Understand the likely areas of regulation that might impact Bitcoin and other decentralized currencies.
   - Develop an initial framework for evaluating different policy choices by nation-stated in these areas.
   - Develop an appreciation for likely regulatory areas of concern when starting or working at a Blockchain-based business.

11. **Cryptocurrency and innovation: Applying framework of the innovators dilemma, and competitive strategy to cryptocurrencies.**
   - Understand the core principles of innovation at an introductory level.
   - Understand the impact of innovation in today's world.
   - Introduction of innovation's models and frameworks.
   - Apply the concepts of innovation the development of Bitcoin and Digital Currencies.

12. **Cryptocurrency and the developing world: Understanding cryptocurrencies' potential impact on microfinance, infrastructure development, and non-traditional payment systems (M-Pesa).**
   - Understand digital currencies' potential impact on infrastructure development and non-traditional payment systems (M-Pesa).
   - What 'financial inclusion' and 'financial communication', on a global scale, could mean for underdeveloped countries.
   - An existing example where development leapfrogged the conventional financial services infrastructure through the use of digital transactions.

Learning Activities and Teaching Methods:

Lectures, Seminars, Assignments, Online interviews, Podcasts, Quizzes, Q&A discussions, WebEx - Video Conferences.

Assessment Methods:

Assignments, Quizzes, Forum Participation, Final Exam

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Mastering Bitcoin	Andreas M. Antonopoulos	O.Reily media	2015	ISBN: 978-1-449-37404-4
Bitcoin: A Peer-to-Peer Electronic Cash System	Satoshi Nakamoto	Prentice Hall	2008	https://bitcoin.org/bitcoin.pdf

Selected Online Readings:

http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/...moneycreation.pdf

http://dealbook.nytimes.com/2014/01/21/why-bitcoin-matters/

http://www.usv.com/posts/bitcoin-as-protocol

http://startupboy.com/2013/11/07/bitcoin-the-internet-of-money/

http://startupboy.com/2014/03/09/the-bitcoin-model-for-crowdfunding/

http://mercatus.org/sites/default/files/Brito_BitcoinPrimer_embargoed.pdf

http://www.hmrc.gov.uk/briefs/vat/brief0914.htm

http://fincen.gov/statutes_regs/guidance/html/FIN-2013-G001.html

http://www.scribd.com/doc/212058352/Bit-Coin

http://bitcoinmagazine.com/9671/ethereum-next-gener ation-cryptocurrency-decentralizedapplication- platform/

http://www.andrew.cmu.edu/course/15-749/READINGS/re quired/resilience/lamport82.pdf

Note: an updated list of readings in provided at the end of each lecture given the fact that Digital Currency and Blockchain Technologies constitute recent and rapidly evolving disciplines.