UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
MIS-536	Emerging Topics and Practical Considerations in Blockchains	10
Prerequisites	**Department**	**Semester**
DFIN-511	MIS	Fall/Spring/Summer
Type of Course	**Field**	**Language of Instruction**
Elective	Blockchains and Information Systems	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Dr Elias Iosif	2nd
Mode of Delivery	**Work Placement**	**Co-requisites**
Distance Learning	N/A	N/A

Course Objectives:

The main objectives of the course are to: The main objective of this course is to provide students with a conceptual framework and applied competencies that will assist them understand, apply, assess and manage blockchain- based systems and resources supporting the implementation or utilization of digital currencies as well as other decentralized applications. The course is structured around three broad sections:

- Bitcoin blockchain: technological aspects of the most widely used blockchain (i.e., Bitcoin blockchain) with particular reference and use of the respective implementation (i.e., Bitcoin Core);
- Advances in core technological aspects of blockchains: network security and anonymity, scalability and interoperability, forks and consensus mechanisms;
- Emerging decentralized applications and other related technological areas: indicative use cases of emerging applications (prediction markets and exchanges) along with related issues (e.g., digital identities), as well as the relation of blockchains with Internet-of-Things and Artificial Intelligence.

Learning Outcomes:

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

- Understand and use Bitcoin Core;
- Understand, critically assess and evaluate different blockchain systems;
- Understand and analyze fundamental mechanisms of blockchain systems including consensus and forks;

- Critically assess blockchain implementations in terms of network security and anonymity;
- Understand technological challenges such as scalability and interoperability;
- Assess and acquire knowledge on decentralized applications (e.g., prediction markets) based on blockchains and critically assess the respective services;
- Identify technologies that can be integrated with blockchains (e.g., Internet-of-Things and Artificial Intelligence);
- Examine the blockchain ecosystem, identify best practices as well as opportunities for implementations or investment

Course Content:

- Bitcoin Script
- Bitcoin Core
- Network protection
- Anonymity and fungibility
- Scalability
- Lightning Network and Ethereum scalability
- Forks
- Consensus mechanisms
- Blockchain interoperability
- Self-sovereign identities
- Decentralized applications: decentralized prediction markets and exchanges
- Opportunities and challenges in a world powered by Internet-of-Things, Artificial Intelligence and blockchain

Learning Activities and Teaching Methods:

Lectures and assignments

Assessment Methods:

Assignment 1, Assignment 2, Final Exam

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Mastering Bitcoin: Programming the Open Blockchain". 2nd Edition	Andreas M. Antonopoulos	Sebastopol: O'Reilly Media	2017	ISBN-13 :978-1491954386 ISBN-10: 1491954388

“Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder	Princeton University Press	2016	978-0-691-17169-2
“Bitcoin and Blockchain Security”	Ghassan Karame and Elli Audroulaki	Princeton University Press	2016	ISBN-13: 978-1630810139 ISBN-10: 9781630810139
Threshold-optimal DSA/ECDSA signatures and an application to Bitcoin wallet security”. In Proc. of International Conference on Applied Cryptography and Network Security (pp. 156-174).	Gennaro, R., Goldfeder, S., and Narayanan, A.		2016	Article
A survey on security and privacy issues of bitcoin”	Mauro Conti, Sandeep Kumar E, Chhagan Lal and Sushmita Ruj		2017	Article
On Scaling Decentralized Blockchains”	Kyle Croman et al.		2016	Article
“Blockchain Forks”	Shaan Ray		2017	Article
The Bitcoin Lightning Network”	Joseph Poon and Thaddeus Dryja		2016	Article
“ConsensusPedia: An Encyclopedia of 30 Consensus Algorithms A complete list of all consensus algorithms	Vaibhav Saini		2018	Article
Enabling Blockchain Innovations with Pegged Sidechains	Adam Back, Matt Corallo, Luke Dashjr, Mark Friedenbach, Gregory Maxwell, Andrew Miller, Andrew		2014	Article

	Poelstra,Jorge Timón, and Pieter Wuille			
“Chain Interoperability”	Vitalik Buterin		2016	Article
“The Inevitable Rise of Self-Sovereign Identity”	A white paper from the Sovrin Foundation		2017	Article
“The (Unfulfilled) Potential of Data Marketplaces”	Koutroumpis Pantelis, Aija Leiponen, and Llewellyn DW Thomas		2017	Article
“Prediction Markets, Explained”	Chrisjan Pauw		2018	Article
Blockchain Oracles, Explained”	Jon Buck		2017	Article
“Blockchain: The Next Breakthrough in the Rapid Progress of AI”, Robotics & Automation Engineering Journal	S. Makridakis, A. Polemitis, G. Giaglis and S. Louca		2018	Article