UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
COMP-387	Blockchain Programming	6
Prerequisites	**Department**	**Semester**
COMP-211 Data Structures	Computer Science	Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Computer Science	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr. Kostas Karasavvas	3rd or 4th
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objective of the course is to provide a deep understanding of the Blockchain Software architecture and to develop relevant practical skills. Topic areas of the course include:

1. Specification of Blockchain Architecture, Protocols and supported processes
2. Existing Blockchain implementations.
3. Smart Contracts.
4. Blockchain security.
5. Blockchain applications design and development

Learning Outcomes:

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

1. Critically compare and evaluate different approaches/implementations of Blockchains.
2. Provide thorough security analysis of Blockchain implementation.
3. Understand Smart Contracts concept and implementation and application issues
4. Design and develop blockchain software suits for different applications in Business, Industry, Medicine, etc.
5. Be aware of new developments and trends in the subject area.

Course Contents:

1. Electronic transactions without relying on trust protocol specification. Security. Blockchain: architecture, transactions and blocks.
2. Bitcoin clients, APIs, Blockchain exploration, transaction scripting.
3. Blockchain Security. POW, POS Delegated POS. Hybrid solutions.
4. Public and private Blockchains. Hybrid blockchains.
5. Ethereum. Architecture. Smart contracts. DAO.
6. Ethereum Smart Contracts development. Solidity.
7. Ethereum Smart Contracts: connecting external data.
8. Smart Contracts Industry Applications
9. Use Cases: Augur
10. Use Cases: Rootstock
11. Use Cases: Waves Platform. Decentralized markets and exchanges
12. Uses Cases: New ideas and upcoming projects.

Learning Activities and Teaching Methods:

Lectures, Lab Presentations, Lab Tutorials, Practical Exercises (Bitcoin APIs and RPC, Solidity, Smart Contracts Development, Waves Platform and Waves Node APIs), Project and Assignments (e.g. making critical comparisons among coins from a technical perspective).

Assessment Methods:

Project (creating own currency), Continuous Assessment / participation, Final Exam.

Recomended Textbooks / Reading:

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

Recommended Articles / Reading List:

- Original Satoshi article (http://bitcoin.org/bitcoin.pdf)
- Exploring traffic with wireshark-bitcoin dissector (https://github.com/lbotsch/wireshark-bitcoin)
- Bitcoin Protocol Specifications(https://en.bitcoin.it/wiki/Protocol_specification)
- Bitcoin transaction Scripting (https://en.bitcoin.it/wiki/Script)
- Majority is not Enough: Bitcoin Mining is Vulnerable (http://arxiv.org/abs/1311.0243)

- Two Bitcoins at the Price of One? Double-Spending Attacks on Fast Payments in Bitcoin (http://eprint.iacr.org/2012/248.pdf)
- Ethereum Project (https://ethereum.org/)
- Waves Platform for Developers (https://wavesplatform.com/developers)