Course Code	Course Title	ECTS Credits
COMP-541	Digital Currency Programming	10
Prerequisites	**Department**	**Semester**
DFIN-511	Computer Science	Fall/Spring/Summer
Type of Course	**Field**	**Language of Instruction**
Elective	Computer Science	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Dr. Dmitry Apraksin	2nd
Mode of Delivery	**Work Placement**	**Co-requisites**
Distance Learning	N/A	N/A

Objectives of the Course:

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

1. Specification of Digital Currency Architecture, Protocols and supported processes
2. Existing Digital Currency implementations. Digital Currency cloning.
3. Digital currency emission. Digital currency Mining.
4. Digital Currency security. Blockchain alternative use.
5. Digital currency e-commerce applications development

Learning Outcomes:

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

1. Critically compare and evaluate different approaches/implementations of Digital currencies.
2. Design and develop software suit for new digital currency.
3. Provide thorough security analysis of Digital Currency implementation.
4. Suggest and implement Digital Currency extensions using relevant scripting techniques (Colored Coins paradigm)
5. Design and develop digital currency e-commerce applications using relevant development tools and protocols (Bitpay 'insight', 'bitcore', cosign', etc.)

Course Contents:

1. Electronic transactions without relying on trust protocol specification
2. Digital currency transaction scripting.
3. Digital currency clients. APIs.
4. Row transactions using Digital currency clients.
5. Digital currency cloning.
6. Creating own Digital currency.

7. Digital currency mining fundamentals. CPU, GPU and ASIC mining.
8. Mining pools.
9. Digital currency security. Threats and possible counter actions.
10. Digital currency development API libraries and toolkits
11. Digital currency and e-Commerce. Accepting Digital currency payments.
12. Blockchain alternative implementations.

Learning Activities and Teaching Methods:

Lectures, Lab Presentations, Lab Tutorials, Practical Exercises (bitcoind APIs and RPC, Bitcoin testnet, transaction scripting), 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)