Overview and Objectives

Blockchain is a disruptive foundation technology that enables complex use cases where a single source of truth is needed. It is part of the resulting technology stack in the transition from centralized computing, storage, and processing to decentralized architectures and systems.

First, this course will explore the technologies that make up the ‘blockchain’ technology, such as the Merkle Tree, Hashing, etc. and how this technology comes together to solve many common problems in business today. Beside the payments use case (cryptocurrencies), Blockchain technology opens many opportunities to redesign collaborative business processes such as supply chain and logistics processes.

Real world example businesses will be spotlighted as examples, and industry experts will present on their blockchain experience, and business experience with the technology. Students will have a firm grasp on the far-reaching possibility of the technology, and be inspired to create their own new implementation.

Finally, the students will have a hands-on experience to create a blockchain application but also to see how blockchain interacts with Internet of Things and how it is seen from an analytics perspective.

Course Outline

Day 1: Discover and Understand Blockchain (3 Hours)

Instructor: Verónica Torras

What is the Blockchain

- Definition of a blockchain
- Immutability (cryptography, hashing)
- Verifiability (public / private keys, digital signature)
- Decentralization
Blockchain: From First Principles to Analytics

- Consensus algorithms (community, rewarding system, proof-of-work, proof-of-stake, others) — Exercise #1: differences between the two PoW and PoS consensus
- Tokens
- Smart Contracts
- Bitcoin, the history of blockchain
- Exercise #2: — with the computer — Hands on exercises with Ardor: Students create an Ardor account to get Ardor and Ignis testnet tokens. We will then show them how to do a transaction and how to send a message on the blockchain. This is a very basic demo, but they get to see by themselves how blocks are created and balances transferred.

Day 2: Blockchain in Business (1.5 Hours)

Instructor: Verónica Torras

Explain why the blockchain technology is relevant for the business world.

- Why blockchain is important for business
- Smart contracts
- Type of blockchains
- Common blockchains used for business
- Industry problems
- Deeper understanding of the Ardor technology as an example of a multi-chain blockchain:
  - parent-child chain architecture
  - bundling process
  - lightweight smart contracts
  - pruning
  - the blockchain-as-a-service model

Day 3: Blockchain business use cases (1.5 Hours)

Instructor: Verónica Torras
18D027
Blockchain: From First Principles to Analytics

3 ECTS

Students will see a large variety of business use cases in different sectors:

- Fintech
- Insurance
- Health
- Supply Chain
- Import/export
- Education
- Digital media
  - Public administrations
  - Real estate

Day 4: Guest: Joan Manel Vilaseca will present us two business cases he has /is working on

Instructor: Verónica Torras, with Guest speaker Joan Manel Vilaseca (2 hours)

- First-hand experience on two Business cases with Joan Manel Vilaseca
- Resolution of doubts on how to approach the Business Case with Verónica Torras

Day 5: Context + Hyperledger + NLP (3 hours)

Instructor: Gaston Besanson with Sandra Orozco and Xabier Beraza

This day objectives are:

- Blockchain in the context of Analytics and AI
- Introduction to Hyperledger Projects and tools. Introduction to Hyperledger Fabric Architecture (transactions, chain codes, consensus)
- Hands on exercises with Composer Playground
- NLP Analysis to ICO whitepapers

Day 6: Ethereum and Dapps (3 hours)

Instructor: Gaston Besanson with Adria Aguilo and Hamza Diaz
This day objectives are:

- Hands on exercises with Ethereum and Dapps
- Create a Dapp

Day 7: Blockchain & IoT / Finance (3 hours)

Instructor: Gaston Besanson with Sandra Orozco and Xabier Beraza

This day objectives are:

- Blockchain and IoT: Traceability example
- Strategies to trade tokens: Reinforcement Learning
- Example of the use of Network Analysis on Blockchain data
- Introduction to the challenge: Analytics solutions for Blockchains

Day 8: Presentations (3 hours)

Instructor: Gaston Besanson with team

This day objectives are:

- The students will present their solutions.

Required Activities

To be determined by the Professor

Evaluation

The course will be evaluated by two projects. One is focus on the development of a business case, while the other on an analytics solution for blockchains. Both will count for half of the grade.
Delivery date of the business case:

Students will have to build a blockchain use case following the instructions of the following guide: https://barclonagse.box.com/s/ppsq1hrp2sli5kgyscnye9apuyt4ycu10

Send it to Veronica Torras, veronica.torras@barcelonagse.eu by May 15th.

Delivery date of Analytics Solution:

May 31th 2019, to Gaston Besanson

To gaston.besanson@accenture.com