Course guide
200251 - DEB - Data Engineering and Blockchain

Unit in charge: School of Mathematics and Statistics
Teaching unit: 744 - ENTEL - Department of Network Engineering.
Degree: BACHELOR'S DEGREE IN MATHEMATICS (Syllabus 2009). (Optional subject).
Academic year: 2022 ECTS Credits: 3.0 Languages: English

LECTURER

Coordinating lecturer: JOSE LUIS MUÑOZ TAPIA
Others: Primer quadrimestre: JOSE LUIS MUÑOZ TAPIA - M-A

PRIOR SKILLS

Basic programming skills.

REQUIREMENTS

There are no pre-requisites.

TEACHING METHODOLOGY

Master classes mixed with practices.

LEARNING OBJECTIVES OF THE SUBJECT

STUDY LOAD

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<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>20.00</td>
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<td>Hours large group</td>
<td>15,0</td>
<td>20.00</td>
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<tr>
<td>Self study</td>
<td>45,0</td>
<td>60.00</td>
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Total learning time: 75 h
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### Blockchain and Proof of Work (PoW)

**Description:**
Blockchain and Proof of Work (PoW)

**Specific objectives:**
- Sybil attacks and consensus with Proof of Work (PoW).
- The blockchain.
- Verifying transactions.
- Attacks to PoW.
- Mining pools.
- Mining with Application-Specific Integrated Circuits (ASICs).
- Governance and forks.

**Full-or-part-time:** 12h 30m
- Theory classes: 2h 30m
- Practical classes: 2h 30m
- Self study: 7h 30m

### Coin-based Ledgers

**Description:**
Coin-based Ledgers

**Specific objectives:**
- Unspent Transaction Outputs (UTXOs).
- Introduction to Bitcoin.
- Bitcoin’s script.
- Wallets and Hierarchical Deterministic (HD) wallets.

**Full-or-part-time:** 12h 30m
- Theory classes: 2h 30m
- Practical classes: 2h 30m
- Self study: 7h 30m

### Balance-based ledgers

**Description:**
Balance-based ledgers

**Specific objectives:**
- Basic principles of balance-based ledgers.
- Attacks and countermeasures to balance-based ledgers.
- Introduction to Ethereum.
- Simulation of an Ethereum blockchain.

**Full-or-part-time:** 12h 30m
- Theory classes: 2h 30m
- Practical classes: 2h 30m
- Self study: 7h 30m
Smart contracts

Description:
Smart contracts

Specific objectives:
Introduction to programming smart contracts.
Basic game theory applied to smart contracts.
Study of use cases: remote purchase, tokenization, Initial Coin Offerings (ICOs).

Full-or-part-time: 15h
Theory classes: 3h
Practical classes: 3h
Self study: 9h

GRADING SYSTEM

35% partial test and questions.
35% Laboratory.
30% Final work (this is a work that will be delivered as a small research paper and that will be presented by students in the class).

BIBLIOGRAPHY

Basic: