CSE400/600: BitCoin and Blockchain Programming

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Course Description

BitCoin/Blockchain is set to disrupt many industries, including banking, supply-chain, insurance, cloud, information-technology and beyond. This course teaches about the BitCoin/Blockchain technology from a practice perspective. The learning objective is for students to acquire programming skills for application development on Bitcoin and Blockchain. Towards the goal, it features lectures and a series of hands-on labs and projects based on a real BitCoin software (ethereum.org). It will cover Bitcoin and Blockchain in terms of their programming API, applications and internal mechanisms.

This will be a 3-credit course.

Prerequisite/Co-requisite

- Basic programming skills are required.
- Knowledge in cryptography is *not* required.

Audience

Graduate/undergraduate students interested in learning the BitCoin and Blockchain technique.

Learning Objectives

Students will be able to design and develop Blockchain-based software for applications in BitCoin and beyond. Students will have in-depth knowledge about the Blockchain platform and will be able to analyze application security.

Texts - Recommended

Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, [online-book version]

Grading

Programming labs (100%)

Course Schedule (Tentative)

- Lecture: Bitcoin/Blockchain API: Transactions and smart contract
- Lab 1: Smart contract programming in Ethereum/Solidity
- Lecture: Domain applications on Blockchain
- Lab 2: BitCoin Wallet for E-payment Application
- Lab 3: Access Control on Smart Contract for Permissioned Blockchain
- Lecture: Application and smart-contract security
- Project 1 (Choose one):
    - Archiving legal documents on Blockchain
    - Medical supply-chain on Blockchain
    - Infrastructure management with Blockchain
    - Cloud storage on Blockchain

- Lecture: Blockchain internals: Storage and mining.
- Lab 4: Exploring Blockchain mining and consensus protocol