

## CS48001/SEC532 – Blockchain: Security and Applications Spring 2020-2021

### Description and objectives

- This course aims to provide a survey on blockchain and the topics around such as history of blockchain, cryptography it uses, Bitcoin and other currencies, consensus algorithms, smart contracts, scalability etc.
- The main motivation is making the students understand the components of blockchain, the terms, jargon people use, the things one need to consider while designing and implementing one, integrating a blockchain to a real life application. In addition, after the lecture, the students can implement objects on a blockchain such as a smart contract on Ethereum, Avalanche and Algorand.

### Topics to be covered

- Introduction to Blockchain: its history and current state
- Practical applications of public and private blockchains
- Bitcoin internals
- Ethereum and smart contracts
- Proof of Stake, BFT and other consensus algorithms
- Blockchain scalability and interoperability
- Conclusions and recap

### Instructor

- Dr. Kamer Kaya, FENS G012, ext. 9566.
- Office Hour: by appointment – you can also send e-mails.

### Textbook(s)

There are no formal books but you are free to read the following. They are free. You do not need to buy them.

- *Mastering Bitcoin* by Andreas Antonopoulos:  
<https://drive.google.com/file/d/0B8lgcDXI8hEfbXFYcTh6aXNqRkk/view?usp=sharing>  
Source: <https://github.com/bitcoinbook/bitcoinbook>
- *Mastering Ethereum*, by Andreas M. Antonopoulos, Gavin Wood:  
<https://github.com/ethereumbook/ethereumbook>
- *Bitcoin and Cryptocurrency Technologies (Princeton textbook)* by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder:  
[https://d28rh4a8wq0iu5.cloudfront.net/bitcointech/readings/princeton\\_bitcoin\\_book.pdf](https://d28rh4a8wq0iu5.cloudfront.net/bitcointech/readings/princeton_bitcoin_book.pdf)

### Schedule

- Mon 12:40-13:30, <https://sabanciuniv.zoom.us/j/93677921525?pwd=SG1EaG9BcTBSS1ILK2RRL3BIZTNEQT09>
- Wed 10:40-12:30, <https://sabanciuniv.zoom.us/j/93677921525?pwd=SG1EaG9BcTBSS1ILK2RRL3BIZTNEQT09>

### Grading:

- Midterms (0%) There won't be any midterms.
- Quizzes (30%)
  - Dates: TBA (there will be 4 quizzes)
  - Maximum 3/4 will be taken into account
    - 30-40 minutes, attendance will be taken through Zoom,
    - cameras, audio will be open etc.
- Group project (40%)
  - Proposal: TBA
  - Final presentations: Last week during the lecture hours
  - Final code submission with corrections: TBA
- Homework assignments (20%): There will be 3-4 (technical and non-technical) homework assignments.
- Paper presentation (10%): Group paper presentation – 20 minutes. 4 people (5 minutes each)

### Reminder:

- For proctored exams, your webcam and microphone should be on during the exam. In the case of non-compliance with this and other declared exam procedures, your exam will be void. Make sure to check that your webcam and microphone function properly before the exam.
- You must attend the synchronous Zoom lectures, recitations, etc. and real-time online exams with your SU email account.
- You may be asked to take an oral exam if the instructor of the course thinks that it is necessary.