

New York University Tandon School of Engineering
Computer Science and Engineering Department
Course Outline [CS-UY 3943] Course Section [BK409]
Introduction to Blockchain and Distributed Ledger Technology
Spring 2020
Professor Ayesha Kiani
Tu Th 9:30 am - 10:50 am
Rogers Hall, Rm 503 Loc: Brooklyn Campus

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Office hours: by appointment

Course Prerequisites: CS-UY 1134 (Data structures and Algorithms) , CS-UY 2413 (Design and Analysis of Algorithms) and MA-UY 2314 (Discrete Mathematics). It is very important for the students to have the basic understanding of Computer Science or Cryptography. Blockchain and Cryptocurrency by nature are very technical topics and therefore, this course is for students who are interested in learning and implementing it more.

Course Description: Blockchain is the first successful technology that enables trust without any authority. This course examines the foundations of blockchain technology from technical perspectives. It is designed to provide students with an understanding of key concepts and developments around cryptocurrencies and distributed ledger systems. By the end of this course you will understand how blockchain work and the ideas, technologies, and organizations sprouting from it.

Course Structure: Most of the material will be presented in lectures. Reading assignments from online, homework assignments will reinforce this material. You should expect to spend a substantial time researching on the homework assignments. 1 hour of lecture per week, 40 minutes of interactive discussion. Assignments and other important announcements will be posted on NYU Classes. You should check the course page every day and sign up for e-mail notification of announcements.

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

(Optional/Additional) Mastering Bitcoin by Andreas Antonopoulos:

PDF: <https://drive.google.com/file/d/0B8lgcDXI8hEfXFYcTh6aXNqRkk/view?usp=sharing>

Source: <https://github.com/bitcoinbook/bitcoinbook>

Course requirements:

Grading will be based on Homework and Quizzes (30%), Attendance (20%), Final Paper (30%), Presentation (10%) and Participation (10%). There will be assigned readings each week, which you should complete in order to do well. Quizzes are intended to be a quick, easy screen designed for you to demonstrate that you completed your readings for the current week's topic. We will administer quizzes on random weeks. Final will be based on all the material covered in the class. Students will do a final presentation in

class on a topic that they hope to work on in near future. Submitting a final paper and presentation is required to pass the class.

Course Topics:

Jan 28 and Jan 30: Bitcoin Protocol - A technical overview

Feb 4 and Feb 6: Bitcoin and Blockchain History: From anonymity to widespread adaption.

Feb 11 and Feb 13: Blockchain and Bitcoin Dynamics: Public and Private Blockchains, Hard and Soft Fork and Side Chains.

Feb 18 and Feb 20: Introduction to Cryptography.

Feb 25 and Feb 27: Application of Cryptography to Blockchain.

March 3 and March 5: Ethereum and Smart Contracts - A Decentralized Future - Guest lecture by Viktor Bunin on March 3

March 10 and March 12: CryptoEconomics - Proof of Stake and Proof of Work - Guest lecture by Santiago Roel Santos on March 12

SPRING BREAK

March 24 and March 26: Distributed Systems and Alternative Consensus - Guest lecture by Ricky Li on March 26

March 31 and April 2: Cryptocurrencies and Mass adaptions.

April 7 and April 9: Enterprise Blockchain - Near term possibilities.

April 14 and 16: Scaling Blockchain – Differentiate nodes, sparse data and Merkle trees and Sharding.

April 21 and April 23: Crypto Assets - Tokens, Coins, Securities enabled by Smart Contracts.

April 28 and April 30: Presentations

May 2 and May 4: Presentations and Final Review

May 14: Final

Moses Center Statement of Disability

If you are a student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities (CSD) at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 3rd floor.

NYU School of Engineering Policies and Procedures on Academic Misconduct – complete Student Code of Conduct

- A. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to

exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

- B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:
1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
 2. Fabrication: including but not limited to, falsifying experimental data and/or citations.
 3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
 4. Unauthorized collaboration: working together on work meant to be done individually.
 5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.

6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

NYU School of Engineering Policies and Procedures on Excused Absences – complete policy

- A. Introduction: An absence can be excused if you have missed no more than **10 days of school**. If an illness or special circumstance has caused you to miss more than two weeks of school, please refer to the section labeled Medical Leave of Absence.
- B. Students may request special accommodations for an absence to be excused in the following cases:
 1. Medical reasons
 2. Death in immediate family
 3. Personal qualified emergencies (documentation must be provided)
 4. Religious Expression or Practice

Deanna Rayment, deanna.rayment@nyu.edu, is the Coordinator of Student Advocacy, Compliance and Student Affairs and handles excused absences. She is located in 5 MTC, LC240C and can assist you should it become necessary.

NYU School of Engineering Academic Calendar – complete list

The last day of the final exam period is May 14. Final exam dates for undergraduate courses will not be determined until later in the semester. Do not make any travel plans until the exam schedule is finalized.

Also, please pay attention to notable dates such as Add/Drop, Withdrawal, etc. For confirmation of dates or further information, please contact Susana:

