



Blockchain, Cryptocurrencies and Digital Tokens Demystified

B8776-002 – Summer 2019
Block Week Course, 3.0 Credits
Monday Aug. 5 to Friday Aug. 9 (inclusive), 10:00 to 18:00

<u>Faculty</u>	<u>Office Hours (Aug 5-9)</u>	<u>Email</u>
R.A. Farrokhnia	After class, 18:00-19:00	farrokhnia@gsb.columbia.edu

IMPORTANT: *The class curriculum is comprised of six modules, and no prior technical or advanced math background is required. Nonetheless, given the accretive and sequential nature of the course lectures, it is imperative to attend all sessions and actively participate in class discussions. This course will cover introductory to intermediate-level topics in regard to the underlying technologies. Absence from the first day will result in automatic forfeiture of your registration. Auditing is not permitted (no exceptions). And do pay a visit to fintech.gsb.columbia.edu!*

COURSE SUMMARY

The publication of the pioneering whitepaper by Satoshi Nakamoto on Bitcoin in October 2008 and the creation of its reference implementation heralded a new era in digital currencies and distributed systems, with many other innovations having followed since in a variety of disciplines. By solving a myriad of technical and financial challenges that had impeded the actualization of digital currencies, blockchain and Bitcoin protocols have also enabled the emergence of other imaginative and disruptive ideas for use in and beyond financial services. Given that nascent aspect of these concepts and the startups they have spawned, it may be too early to judge the success, or the lack thereof, of many of them. Nonetheless, there is little doubt about the profound potential effect and future impact of blockchain, cryptocurrencies, and distributed protocols (including consensus) on financial services, technology, economics, trade, healthcare, government, and other relevant realms.

Indeed, it is easy to recognize that we are still in the very early phases of development in this field, and many important questions in regard to implications in classical economics theories, monetary policies, role of central banks, economic growth, fiscal

policies and tax collection, access to financial products, national sovereignty, cybersecurity, and others are yet to be definitively addressed. As such, gaining a solid understanding of the innerworkings and underlying technologies, protocols, and ecosystems is critical in order to see through the hype and discern the real potential.

This class offers a comprehensive and interdisciplinary primer on the aforementioned subject matters, with a format particularly suitable and accessible for those who have little or no technical background. We will start by covering the basics and fundamental building blocks of the technological developments and innovations that made distributed systems and digital currencies such as blockchain and Bitcoin, respectively, possible. We will ultimately end the course on more complex topics and the latest research in the field, including the fundamental challenges to our existing economics and financial frameworks and the incumbent firms as well as potential solutions to such matters.

By the course's conclusion, students will have a firm overview and thorough knowledge of blockchain, cryptocurrencies, and digital tokens ecosystems, real-world applications, and impending questions that are yet to be answered. Participants will also be able to follow literature and technical news with ease, interact with industry participants, formulate ideas and corporate strategy initiatives, and continue learning more advanced topics at their own pace after the completion of the course.

As for the intended audience, MBAs or students from engineering, law, medical, or other graduate schools with an interest in the curriculum who intend to pursue careers in finance, technology, or startups will find the course particularly beneficial, including those with roles as future managers, business development and operations, consultants, strategists, and entrepreneurs. As mentioned, no prior programming, technical, or advanced mathematical skills are required (see prerequisites).

CURRICULUM FORMAT

In summary, the course curriculum is divided into six modules, covering each of the following topics in sequence:

1. Fundamentals of communication networks and web protocols
2. Cryptography and encryption, with a special focus on construct and applications in Blockchain
3. The theory and practice of Blockchain and distributed systems as well as their implementations
4. Bitcoin, the most widely used (thus far!) use case of Blockchain
5. Cryptocurrencies and Digital Tokens
6. More complex topics + latest research and industry developments

In each module, we will cover the background, foundational elements, and technologies underlying the topics at hand, discuss and understand how all the elements, first individually and then as a group, fit together in the overall ecosystem. More details on each module will be shared during the first class session.

COURSE PREREQUISITES

There are no required prerequisites. Recommended, but not required, courses are: 1) “*Capital Markets and Investments*” (B8306), and 2) general familiarity with tech/programming through either a class such as “*Web App Programming in Python*” (B8126) or “*Introduction to Programming Using Python*” (B8136) – having taken these classes would be helpful, but again, it is not a requirement.

GRADING

This course has a demanding curriculum and requires active participation, diligence, and on-time completion of readings and assignments prior to each session. Relevant materials (articles, cases, notes, white- and research papers, news articles, videos, etc.) will be posted in Canvas and/or handed out in before each session.

The final course grades will be calculated using the following criteria:

- a) Final Project and Presentation (40%)
- b) Company Debriefs (30%)
- c) Class Participation (30%)

Details of the grading components mentioned above are:

- a) Final Project (with presentations): during the last day of class, students working in groups of 3-4 per team, will present to class a novel use of blockchain, application specific tokens, distributed consensus systems, or an innovative use-case of the technologies and protocols learned in class. These could be an existing startup or an idea put forth by the student groups themselves.

Each team will present for 5 minutes, followed by up to 5 minutes of Q&A. Electronic and printed versions (two copies) of the presentation should be delivered ahead of time. Additional instructions will be provided in class during our first session, including the idea generation and validation process (to be completed no later than the third session).

In addition to the final presentations, student groups are required to submit a “feasibility study” white paper (maximum of 15 pages, single-spaced) with a comprehensive analysis detailing the idea’s origin, its business proposition, merit, market report, underlying technical implementation, competition, and other applicable evaluative analyses. The deadline to submit this written assignment is **Friday August 16th, 2019 at 12:00 noon EST**.

- b) Company Debriefs: Upon team formations by the end of second class session, teams will be assigned different digital token ventures to conduct research on and submit a two- to three-page executive summary report on its core product/service, funding, team, market, and competition. A template will be given to students to use so to standardize the formatting. Time permitting, up to five teams will randomly be chosen to present their findings to class in each session (two minutes per team presentation).

- c) Class Participation: fairly self-explanatory! Note that attendance is part of this.

EXPECTATIONS AND CONDUCT

Given the complexity of the technical topics covered, students are expected to devote significant time to this class. In order to have meaningful discussions, it is imperative that you come prepared ahead of each session. Class attendance and participation is an integral part of this course learning process, and as such, unexcused absences and disruptive behavior will not only have a detrimental effect on your final grade, but also will be considered disrespectful to your classmates. This course has a strict no laptops or other electronic devices policy during class, unless specifically noted otherwise.

During the last two modules, we may interact in person or via video conference calls with a number of entrepreneurs, practitioners, and companies (both startups and established firms). In order to show the due respect and proper appreciation for the time and effort undertaken by such individuals to participate in and contribute to the course, it is imperative that all students be in full compliance with Columbia’s honor code of professional conduct.

OFFICE HOURS

Students are encouraged to take advantage of course faculty’s office hours. Given the scheduling format of block week classes, office hours will be offered after the end of each day’s session. Sign-up sheets will be provided ahead of time.

Thank you for your interest in this course, and I look forward to having a fun, educational, and productive class with you all.