



70/73-337 - FALL 2024

**Carnegie
Mellon
University**

70/73-337: Business of Blockchain

M/W 12:30pm–1:50pm

All Meetings in TEP 2612

Fall Semester, 2024

Instructor Information:

Professor Ariel Zetlin-Jones

E-mail: azj@andrew.cmu.edu

Office: Tepper 5141

Office Hours: T 2.30pm-4.30pm





Course Description

Economics and business strategy is fundamental for the design and development of blockchain use cases. This course will introduce students to foundational economic concepts to help them understand the role cryptocurrencies play in securing blockchains, how different “tokenomics” models impact cryptocurrency prices, the different means to create liquidity or resolve illiquidity in decentralized finance (DeFi) applications such as stablecoins, collateralized-lending, yield farming, or automated market making, the roles of Central Bank Digital Currencies, as well as models to evaluate the value-added of blockchain-based versus traditional business propositions.

Learning Objectives: By the end of this course you will be able to:

1. Understand the economic foundations of blockchains and their security;
2. Measure price risks of cryptocurrencies and other digital assets;
3. Learn different approaches to creating liquidity via cryptocurrencies;
4. Evaluate the risks associated with different blockchain business models;
5. Describe the purpose of three key areas of Decentralized Finance including stablecoins, collateralized lending, and automated market making;
6. Explain the arguments for or against establishing Central Bank Digital Currencies;
7. Analyze the value-added of blockchain-based business solutions.



Learning Resources

Written Resources: There are two main sources of written resources for you: (i) lecture slides and (ii) a (free, online) textbook accessible via Canvas and the University Library. All of these materials will be posted on Canvas. These materials and our in class discussion of regarding this content will serve as the basis for all of our course quizzes, homework, and exams. In addition, I will post reading assignments to help motivate our learning as well as a textbook on foundations of financial intermediation (written by me) that provides useful background. (If we want to understand decentralized finance, we will need to learn a bit about “finance”!)

Assessments

Final Grade: The final grade will be computed according to the following components:

- Homework (40% of total grade)
- Class presentation & group work (10% of total grade)
- Class participation/Quizzes (10% of total grade)
- Midterm (20% of total grade)
- Comprehensive final (20% of total grade)

Assessment Descriptions

- **Homework:** Homeworks will consist of problems and open-ended questions that ask you to think through concepts and issues we cover in class. You will be permitted to consult and work with classmates on your assignment, but we expect your work to be your own.

Class Presentation and Group Work: Early on in the semester, I will organize the class into groups. Each of these groups will select a blockchain use



case and be asked to examine the nature of the use case and the economics underlying it. At the end of the semester you will be asked to produce a write-up of your findings. It will be about as long as homework assignment. For your group-work to be successful, you will have to display in-depth knowledge of your chosen topic. Also, your group will have to display how the tools learned in the semester have been used in your work.

- **Exams:** There will be one midterm and a final exam. The midterm will be in person and closed-book. The final exam will be in person during the last week of class. I do not surprise students with unexpected questions in the exams. I prepare the exams so that any student who consistently works on homework sets, attends lectures, watches recitations, and carefully reads the slides, notes or textbook should do well at the end.
- **Participation/Quizzes:** We will aim to begin each week with a short (10 minute) quiz that asks you questions about an assigned reading. It will not be challenging to complete if you have completed the reading in advance. We use these quizzes as a starting point for discussion about what features of blockchains, cryptocurrency, and applications we would like to learn about that week. We will drop your lowest 3 quiz results so you should not worry about missing any given week's quiz.

Final grades will be based on your cumulative score. Students who obtain a final cumulative score of 90-100% will receive an A. Students who obtain a final cumulative score of 80-89% will receive a B. Students who obtain a final cumulative score of 70-79% will receive a C. Students who obtain a final cumulative score of 60-69% will receive a D, and the rest will receive R's.

In the interests of fairness, we apply the same rules to everyone and we are therefore unable to modify the cumulative score formula or offer you extra work to raise your grade to accommodate your circumstances. The only exception concerns midterms missed due to documented illness or family emergency. Some students will inevitably fall close to, but below a cutoff when we assign grades. Such students sometimes ask for cutoffs to be reduced. Please do not do this. If you are just below a cutoff you may be close to the lowest A or B, but still some way from the average A or B and we consider these when assigning cutoffs.



Grading Policies

Homework will be submitted via Gradescope. Instructions for using and submitting work through Gradescope are available on our course Canvas site. Please check: Canvas > Modules > Course Materials > Gradescope Instructions.

- **Late-Work Policy:** We do not accept late submissions for homeworks. There are two reasons for this. First we post solutions promptly after the deadline. Second, in fairness to everyone, we want to give all students the same amount of time to get the work done (and it is impossible for us to verify whether work was done late or just turned in late).
- **Make-up Work Policy:** We do not permit make-up work for homework. If you miss a quiz, you will get a zero (and it will be one of your dropped quiz grades). There will be no makeups for midterms. If you miss a midterm for a documented illness, then we will shift the weight to other exams. You will still be able to obtain full credit in the class. The final exam will be on the day designated by the university. There will be a makeup for the final exam on the designated makeup day provided by the university.
- **Re-grade Policy:** All regrade requests must be submitted through Gradescope *within two weeks* of the return of an assessment. Since we post solutions for every assignment, be sure to compare your answers to the solutions before submitting any re-grade requests. Should your request be declined and you would like more information on why, then you may meet with me during scheduled office hours.



Class Schedule

The following is a tentative outline of each lecture (note that an individual lecture does not always overlap with an individual class).

- Lecture 1: Introduction. What is blockchain? What is a ledger? Why are ledgers valuable? (Weeks 1 and 2)
- Lecture 2: Why are blockchains secure? Cryptography and Incentives (Weeks 3–5)
- Lecture 3: Programmable Ledgers and Smart Contracts (Week 6–7)
- Lecture 4: Why are cryptocurrencies secure or insecure? Economics of Stablecoins (Weeks 7–9)
- Lecture 5: Trading Cryptocurrency: Centralized and Decentralized Exchange (Weeks 10–12)
- Lecture 6: Digital Scarcity and Non-Fungible Tokens (Weeks 13)



Diversity Statement

We must treat every individual with respect. We are diverse in many ways, and this diversity is fundamental to building and maintaining an equitable and inclusive campus community. Diversity can refer to multiple ways that we identify ourselves, including but not limited to race, color, national origin, language, sex, disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Each of these diverse identities, along with many others not mentioned here, shape the perspectives our students, faculty, and staff bring to our campus. We, at CMU, will work to promote diversity, equity and inclusion not only because diversity fuels excellence and innovation, but because we want to pursue justice. We acknowledge our imperfections while we also fully commit to the work, inside and outside of our classrooms, of building and sustaining a campus community that increasingly embraces these core values.

Each of us is responsible for creating a safer, more inclusive environment.

Unfortunately, incidents of bias or discrimination do occur, whether intentional or unintentional. They contribute to creating an unwelcoming environment for individuals and groups at the university. Therefore, the university encourages anyone who experiences or observes unfair or hostile treatment on the basis of identity to speak out for justice and support, within the moment of the incident or after the incident has passed. Anyone can share these experiences using the following resources:

- Center for Student Diversity and Inclusion: csdi@andrew.cmu.edu, (412) 268-2150
- Report-It online anonymous reporting platform: reportit.net username: tar-tans password: plaid

All reports will be documented and deliberated to determine if there should be any following actions. Regardless of incident type, the university will use all shared experiences to transform our campus climate to be more equitable and just.



Accommodations for Students with Disabilities

If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at .

I'll close this section with some legal stuff:

All class materials on Canvas are for your use only and are copyrighted. You may not copy and circulate any of these materials or upload them to websites without the prior permission of the copyright holder.



Last word. You may have seen the message below on other syllabi. I repeat it because it is important. Please as you progress through my (and other) courses, take academics seriously, but keep things in perspective. Please seek out help academic or otherwise around campus as you need it. Especially during these unprecedented times, please reach out to your support system for help and to help your friends and peers.

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website at

<http://www.cmu.edu/counseling/>

Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.