

York University
Faculty of Liberal Arts & Professional Studies
Department of Economics
The Economics of Cryptocurrencies AP/ECON 3880
Fall 2022

Instructor: Dr. Andrea Podhorsky

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Course Webpage: <http://eclass.yorku.ca>

Virtual Office Hours: Fridays 12:00 pm – 1:15 pm

Please sign up on eClass to schedule a 15-minute appointment on Zoom.

Technical requirements for taking the course:

Several platforms will be used in this course (e.g., eClass, Zoom, etc.) through which students will interact with the course materials, the course director/TA, as well as with one another. Please review this syllabus to determine how the class meets (in whole or in part), and how office hours will be conducted.

Students shall note the following:

- Zoom is hosted on servers in the U.S. This includes recordings done through Zoom.
- If you have privacy concerns about your data, provide only your first name or a nickname when you join a session.
- The system is configured in a way that all participants are automatically notified when a session is being recorded. In other words, a session cannot be recorded without you knowing about it.

To fully participate in this course, you will need to have access to a computer with webcam and microphone, or a smart device with these features. Please consult the following technological resources, which are accessible from the following resource links:

- eClass: [Student Guide to eClass](#) and [Frequently Asked Questions](#).
- Zoom: [Zoom@YorkU User Reference Guide](#) and [Zoom@YorkU Best Practices](#).

Times and locations:

Please note that this is a course that depends on remote teaching and learning. There will be no in-person interactions or activities on campus.

Organization of the course:

The entire course, including examinations, will take place on the course's eClass page. Although we are scheduled to meet at 11:30 am – 2:30 pm on Mondays, this course has no live virtual meetings outside of our weekly office hours and a live session to introduce myself at the beginning of the course. We will also have an online forum for questions regarding the course material and I will respond to emails as quickly as possible.

I will be teaching this course asynchronously; lecture notes and pre-recorded videos will be posted on the course's eClass page every week. You can learn the course material at your own pace, following the schedule of readings and activities.

Course Description:

This course provides an introduction to cryptocurrencies from an economics perspective. Topics include price determination under the Proof of Work protocol, the use of a tax to restrain network electricity costs, the 51% network attack, the welfare costs and benefits of cryptocurrencies, the surrounding governance issues, and the effects of digital currencies on the monetary policies of central banks.

Prerequisite/Co-requisite:

AP/ECON 1000 3.00 and AP/ECON 1010 3.00 or equivalents.

This course will automatically count towards the BUEC/FBEC special course lists for students in those programs.

Required Course Materials:

Understanding Bitcoin: Cryptography, Engineering and Economics, by Pedro Franco

Recommended Course Materials:

Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder

Mastering Bitcoin: Programming the Open Blockchain, by Andreas M. Antonopoulos

Evaluation:

| | | |
|--------------------------|-----|------------|
| Midterm (Topics 1, 2, 3) | 40% | October 24 |
| Final Exam | 40% | TBA |
| Discussion and Response | 20% | |

This course will utilize the required course textbook in addition to numerous academic articles that are accessible to an undergraduate economics audience.

During the semester, each student will be responsible for leading an online discussion and responding to another student's discussion. The initial discussion must be approximately 500 words long and must identify and directly address one of the main issues posed in the assigned article. Discussion responses should be about 200 words long and must add significant value to the initial discussion. (The article assignments for each student and the discussion and response guidelines will be posted on the course website.)

Grading Policy:

- There will be no make-up mid-term exam. Students absent from the mid-term exam will have the weight transferred to their final exam.

- The final exam will cover all material discussed in this course. The exact date of exam will be scheduled by the Registrar's Office.
- The deferred exam for the final exam will be granted only for medical reasons. In such cases students should submit a deferred exam application together with the supporting documents (attending physician's statement) to the Department of Economics to my attention. The date and time of the deferred exam will be set at a later date. Students who may require further extensions or accommodation will have to submit a formal petition to the Faculty.
- Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

Topics and Schedule:

Topic 1

Bitcoin Foundations and Technology: Money and Trust; Bitcoin Basics (Cryptography); Blockchain; Consensus; 51% Attack

Sept. 12

- Franco Chapter 1, 2, 5, 6; Narayanan et al. Chapter 3

Sept. 13 – Introductory Zoom Session 2 pm

Sept. 19

- Bitcoin Whitepaper (October 2008)

Satoshi Nakamoto

<https://bitcoin.org/bitcoin.pdf>

- The Meaning of Decentralization (February 2017)

Vitalik Buterin

<https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274>

- Why Decentralization Matters (February 2018)

Chris Dixon

<https://onezero.medium.com/why-decentralization-matters-5e3f79f7638e>

- The Future of Money

Neha Narula

<https://www.youtube.com/watch?v=pPg7Hj3ABQ>

1. A Fistful of Bitcoins: Characterizing Payments Among Men with No Names (October 2013)

Sarah Meiklejohn, Marjori Pomarole, Grant Jordan Kirill, Levchenko Damon McCoy, Geoffrey M. Voelker, Stefan Savage

<https://cseweb.ucsd.edu/~smeiklejohn/files/imc13.pdf>

2. Bitcoin Omnibus Survey: Awareness and Usage (November 2019)

Christopher S. Henry, Kim P. Huynh, Gradon Nicholls and Mitchell W. Nicholson
<https://www.bankofcanada.ca/2019/11/staff-discussion-paper-2019-10/>

3. Bitcoin Adoption and Beliefs in Canada (November 2021)

Daniela Balutel, Christopher Henry, Jorge Vásquez, Marcel Voia
<https://www.bankofcanada.ca/2021/11/staff-working-paper-2021-60/>

Topic 2

Bitcoin Mining and Difficulty

Sept. 26

- Franco Chapter 9; Narayanan et al. Chapter 5

Oct. 3

4. The Economic Limits of Bitcoin and the Blockchain (June 2018)

Eric Budish

<https://faculty.chicagobooth.edu/eric.budish/research/Economic-Limits-Bitcoin-Blockchain-June2018.pdf>

5. Assessing Blockchain Consensus and Security Mechanisms against the 51% Attack (April 2019)

Sarwar Sayeed and Hector Marco-Gisbert

<https://www.mdpi.com/2076-3417/9/9/1788/htm>

6. Risks and Returns of Cryptocurrency (July 2018)

Yukun Liu and Aleh Tsyvinski

<https://economics.yale.edu/sites/default/files/files/Faculty/Tsyvinski/cryptoreturns%208-7-2018.pdf>

7. The Blockchain Trilemma (October 2020)

Yves Longchamp, Saurabh Deshpande, Ujjwal Mehra

<https://theblockchaintest.com/uploads/resources/SEBA - The Blockchain Trilema - 2020 - Oct.pdf>

8. Systematic Literature Review of Challenges in Blockchain Scalability (October 2021)

Dodo Khan, Low Tang Jung, Manzoor Ahmed Hashmani

<https://www.mdpi.com/2076-3417/11/20/9372/pdf?version=1634728633>

Oct. 10 – Reading Week

Topic 3

Ethereum and Smart Contracts

Oct. 17

- Franco Chapter 12

- Intro to Ethereum

Ethereum Foundation

<https://ethereum.org/en/developers/docs/intro-to-ethereum/>

- Ethereum Whitepaper (December 2014)

Ethereum Foundation

<https://ethereum.org/en/whitepaper/>

- Your Guide on Bitcoin's Lightning Network: The Opportunities and The Issues (June 2018)

Jonathan Chester

<https://www.forbes.com/sites/jonathanchester/2018/06/18/your-guide-on-the-lightning-network-the-opportunities-and-the-issues/?sh=47f8c4f73677>

Topic 4

Stable Coins and Other Cryptotokens/NFTs

Oct. 24 – Midterm 1:00 pm

- Franco Chapter 11; Narayanan et al. Chapter 10
- Stablecoins 101: What are Crypto Stablecoins, and How Do They Work?

Cointelegraph Media

<https://cointelegraph.com/altcoins-for-beginners/stablecoins-101-what-are-crypto-stablecoins-and-how-do-they-work>

- Non-Fungible Tokens

Ethereum Foundation

<https://ethereum.org/en/nft/>

- 2021 NFT Year in Review

1confirmation Venture Fund

<https://www.1confirmation.com/2021-nft-annual-review>

- Line Goes Up – The Problem with NFTs

Dan Olson

https://www.youtube.com/watch?app=desktop&v=YQ_xWvX1n9g

Oct. 31

9. A Complete History of Bitcoin Forks (June 2022)

Jack Spade

<https://www.cryptovantage.com/guides/a-complete-history-of-bitcoin-forks/>

10. Understanding the Role of Actor Heterogeneity in Blockchain Splits: An Actor-Network Perspective to Bitcoin Forks (2019)

A.K.M. Najmul Islam, Matti Mäntymäki, Marja Turunen

<https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1568&context=hicss-52>

11. Is Bitcoin Really Un-Tethered? (November 2019)

John M. Griffin and Amin Shams

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3195066

Bitfinex and Tether Lawsuit Is Ridiculous on Several Grounds (October 2019)

Futures Magazine

<http://m.futuresmag.com/2019/10/08/bitfinex-and-tether-lawsuit-ridiculous-several-grounds>

Cryptocurrency firms Tether and Bitfinex agree to pay \$18.5 million fine to end New York probe (February 2021)

CNBC

<https://www.cnbc.com/2021/02/23/tether-bitfinex-reach-settlement-with-new-york-attorney-general.html>

12. Initial Coin Offerings and the Value of Crypto Tokens (January 2019)

Christian Catalini and Joshua S. Gans

<https://www.nber.org/papers/w24418>

Topic 5

Proof of Work and Electricity Usage

Nov. 7

- Franco Chapter 7
- Taxing Bitcoin: Incentivizing the Difficulty Adjustment Mechanism to Reduce Electricity Usage (February 2022)

Andrea Podhorsky

http://andreapodhorsky.com/Taxing_Bitcoin.pdf

13. Bitcoin's Growing Energy Problem (May 2018)

Alex de Vries

https://www.researchgate.net/publication/325188032_Bitcoin's_Growing_Energy_Problem

14. Bitcoin Boom: What Rising Prices Mean for the Network's Energy Consumption (March 2021)

Alex de Vries

https://www.researchgate.net/publication/349952553_Bitcoin_Boom_What_Rising_Prices_Mean_for_the_Network's_Energy_Consumption

15. When Cryptomining Comes to Town: High Electricity-Use Spillovers to the Local Economy (May 2021)

Matteo Benetton, Giovanni Compiani, Adair Morse

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3779720

Topic 6

Proof of Stake

Nov. 14

- Why Proof of Stake (Nov 2020)

Vitalik Buterin

<https://vitalik.ca/general/2020/11/06/pos2020.html>

- Blockchain Without Waste: Proof-of-Stake (June 2018)

Fahad Saleh

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3183935

- The Merge

Ethereum Foundation

<https://ethereum.org/en/upgrades/merge/>

Topic 7

Central Bank Digital Currencies (CBDCs)

Nov. 21

- Central Bank Cryptocurrencies (Sept 2017)

Morten Linnemann Bech and Rodney Garratt

https://www.bis.org/publ/qtrpdf/r_qt1709f.htm

- The People's Republic of China's Digital Yuan: Its Environment, Design, and Implications (Feb 2022)

Elijah Journey Fullerton and Peter J. Morgan

<https://www.adb.org/publications/the-peoples-republic-of-chinas-digital-yuan-its-environment-design-and-implications>

- Contingency Planning for a Central Bank Digital Currency (February 2020)

Bank of Canada

<https://www.bankofcanada.ca/2020/02/contingency-planning-central-bank-digital-currency/>

- Money and Payments: The U.S. Dollar in the Age of Digital Transformation (January 2022)

United States Federal Reserve Board

<https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf>

16. Digital Currencies, Decentralized Ledgers and the Future of Central Banking (May 2016)

Max Raskin and David Yermack

https://www.nber.org/system/files/working_papers/w22238/w22238.pdf

17. Demand for Payment Services and Consumer Welfare: The Introduction of a Central Bank Digital Currency (March 2020)

Kim Huynh, Jozsef Molnar, Oleksandr Shcherbakov, Qinghui Yu

<https://www.bankofcanada.ca/2020/03/staff-working-paper-2020-7/>

Topic 8

Governance and stability

Nov. 28

- Narayanan et al. Chapter 10
- Notes on Blockchain Governance (December 2017)

Vitalik Buterin

<https://vitalik.ca/general/2017/12/17/voting.html>

- The Invisible Politics of Bitcoin: Governance Crisis of a Decentralized Infrastructure (October 2016)

Primavera De Filippi and Benjamin Loveluck

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2852691

- The Crypto Ecosystem and Financial Stability Challenges (October 2021)

International Monetary Fund

<https://www.imf.org/-/media/Files/Publications/GFSR/2021/October/English/ch2.ashx>

- Executive Order on Ensuring Responsible Development of Digital Assets (March 2022)

President Joseph R. Biden Jr Executive Order

<https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/09/executive-order-on-ensuring-responsible-development-of-digital-assets/>

<https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/09/fact-sheet-president-biden-to-sign-executive-order-on-ensuring-responsible-innovation-in-digital-assets/>

- Blockchain & Cryptocurrency Laws and Regulations 2022 – Canada

Global Legal Insights

<https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/canada>

Topic 9

Bitcoin and Developing Countries

Dec. 5

18. How Do Private Digital Currencies Affect Government Policy? (September 2019)

Max Raskin, Fahad Saleh & David Yermack

<https://www.nber.org/papers/w26219>

19. Flight to Bitcoin (February 2022)

Gloria Yang Yu, Jinyuan Zhang

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3278469

20. Cryptocurrencies as Asset-Backed Instruments: The Venezuelan Petro (February 2018)

Usman W. Chohan

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3119606

21. Oil as Currency: Venezuela's Petro, a New 'Oil Pattern'? (January 2018)

Ignacio Herrera Anchustegui and Tina Soliman Hunter

<https://www.researchgate.net/publication/329794267> Oil as Currency Venezuela's Petro a New 'Oil Pattern'

22. Are Cryptocurrencies Currencies? Bitcoin as Legal Tender in El Salvador (April 2022)

Fernando E. Alvarez, David Argente & Diana Van Patten

<https://www.nber.org/papers/w29968>

23. A Poor Country Made Bitcoin a National Currency. The Bet Isn't Paying Off. (July 2022)

The New York Times

<https://www.nytimes.com/2022/07/05/world/americas/el-salvador-bitcoin-national-currency.html>

Important Course Information for Students:

All students must read and acknowledge the [LA&PS Course Policies](#) as they regard:

Intellectual property notice, Accessibility, Policies related to Zoom meetings, Student conduct and Academic integrity.

In addition, all students are expected to familiarize themselves with the following information, available on the Senate Committee on Academic Standards, Curriculum & Pedagogy webpage <https://secretariat.info.yorku.ca/files/CourseInformationForStudentsAugust2012-.pdf> regarding the Senate Policy on Academic Honesty and the Academic Integrity Website; Course requirement accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities; Student Conduct Standards and Religious Observance Accommodation.

Course Add/Drop Deadlines:

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|---|------------------|
| Last date to add a course without permission of instructor (also see Financial Deadlines) | Sept. 20 |
| Last date to add a course with permission of instructor (also see Financial Deadlines) | Oct. 4 |
| Last date to drop a course without receiving a grade (also see Financial Deadlines) | Nov. 11 |
| Course Withdrawal Period (withdraw from a course and receive a grade of "W" on transcript – see note below) | Nov. 13 – Dec. 7 |

Policy and Guidelines on Withdrawn from Course:

<https://secretariat-policies.info.yorku.ca/policies/withdrawn-from-course-w-policy-and-guidelines/>