

Economics 498
Cryptocurrencies and Blockchains
Fall 2021
Gerald P. Dwyer

Class is scheduled from 11:00 to 12:15 Tuesday and Thursday in the Business School Building in Room 229. Tuesday will be a brief lecture over some material and Thursday will consist of discussion. The Tuesday class, which generally will not be an hour and fifteen minutes long, will be on Zoom. Office hours are 3:30 to 4:30 Tuesday and Thursday and by appointment. Ask for an appointment by sending an email to gdwyer@clemsun.edu. Do not send emails to the Google version of this address. I will not receive them.

GENERAL

This course will cover the relatively new area of cryptocurrencies and blockchains. It is not intended to be particularly technical although some parts of it will require close attention. The course does assume that you have taken Intermediate Microeconomics or were a particularly good student in Principles of Economics.

A basic purpose of this course is to provide you with enough theoretical background to understand cryptocurrencies and blockchains, particularly their economic and financial aspects. This is not a course in the computer-science aspect of cryptocurrencies, although it is impossible to understand cryptocurrencies and blockchains without an acquaintance with cryptography and the programming aspects of cryptocurrencies and blockchains.

This is a reading class with discussion. There will be a new reading each week. There is quite a bit of reading.

Each Thursday, the reading for the following week will be assigned. You are expected to read the material by the following Tuesday. I will give you a list of general questions that you might use to guide your reading. If something interests you that I did not mention, by all means pay attention to that.

On Tuesday, I will provide some information related to the reading using slides. I mostly will explain more technical or unfamiliar material that might cause you difficulty. I also will answer any questions that you have. I will not summarize the reading or cover the most important points.

The Tuesday lecture will be on Zoom. Some lectures will be short and the marginal cost of taking the time to come to class is high for a short lecture.

On Thursday, we will meet in class to discuss the material. On Thursday, you also will be expected to hand in a short summary (three or four pages) of the reading.

The timeline below may make it clearer how the class will work. Each Thursday, there will be a new reading assigned for the coming week. Tuesday, there will be a brief lecture and you can ask questions about the reading. Thursday, your summary of the reading is due and we will discuss the reading and anything related. Then repeat with new reading assigned. And so forth.

| | | |
|------------------|---------------------------|-------------------------|
| Reading assigned | Brief lecture. Questions? | Discussion. Summary due |
| Thurs | Tues | Thurs |

The exams will include questions that require the application of economic and financial theory to cryptocurrencies and blockchains. They will assume that you are familiar with the material in the assigned readings and have thought about them.

The readings will be from the required book and material available on Canvas.

REQUIRED BOOK

A Random Walk Down Wall Street

By Burton G. Malkiel

W. W. Norton & Company; Twelfth edition (2020)

A solid general introduction to investment theory and markets.

WEEKLY SUMMARIES OF READING

The summary due on Thursdays should be more than an abstract but need not be more than three or four double-spaced pages. You should emphasize the main point or points of the reading and how those points are supported. After reading the material, what do you think? You can indicate any problems you see in the underlying arguments. You also can indicate any questions you have after reading the material. The summaries must be prepared on a computer and not hand written.

The summaries will be graded. The grades will range from A to D with an A given for a serious, thoughtful summary and a D given for a summary that says little more than what is said in the introduction to the reading and the lecture.

You can fail to hand in the summaries for two weeks without penalty. If you skip writing summaries for more than two weeks, you will be given an F for those missed summaries.

ATTENDANCE POLICY

Your attendance will be 20 percent of your grade. This is a discussion class and it can work only if everyone attends and participates. You have two unexcused absences on Thursdays without penalty.

TESTS

There will be one midterm and one final. The final will be a take-home exam. The mid-term will be an in-class exam on October 14. The final will be available on Thursday, December 2. The exam will be due on the scheduled exam date, Wednesday, December 8.

I expect that you will work on the final with others and encourage you to do so, but you must write up your own answers to the questions

GRADES

Your grade will be based on class attendance (20 percent), your weekly summaries of the readings (20 percent) and the exams (20 percent for the midterm, 40 percent for the final).

Twenty percent of your grade will be based on attendance. For the attendance part of your grade, you have two unexcused absences free. Your grade will be based on the number of classes you attend after that. For example, if there were twelve classes and you missed four classes, you would have missed 20 percent of the classes above the two ignored misses, $(4-2)/(12-2)$ and you would receive an 80 on this part of your grade. If you miss one or two classes, you will receive a 100 on this part of your grade. Obviously, if you are sick with a verified excuse, an absence won't count as one of your free absences but you must provide some evidence for your excused absence.

Twenty percent of your grade will be based on summaries of the readings submitted weekly. The summary should be more than an abstract but need not be more than three or four double-spaced pages. After reading the material, what do you think? You can emphasize the main point of the reading and how that point is supported. You can indicate any problems you see in the underlying arguments. You also can indicate any questions you have after reading the material. I will give you a handout with questions that I think will guide the discussion the following week and will provide an indication of what material is most important. The summary must be handed in before class and no late work will be accepted without a university-approved absence. If you miss class and it is a free absence, the lack of a summary will not be counted against you. The summaries must be prepared on a computer and not hand written.

The midterm will be twenty percent of your grade. The final will be forty percent of your grade.

University-required statements appear at the end of the syllabus.

READING LIST

You are expected to have read over the material for each class *before* the Tuesday class. The readings are from the required book and material available on Canvas. An asterisk "*" indicates required reading. The dates are tentative. The readings may change.

| Date | Topic | Readings |
|---------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| August 19 | Set up course | |
| August 24 and 26 | Private money | * F. A. Hayek, Denationalisation of Money Milton Freidman and Anna J. Schwartz, "Has Government Any Role in Money?" |
| August 31 and September 2 | Theory and history of private monies | * Benjamin Klein, "Competitive Supply of Money" George A. Selgin and Lawrence H. White, "How Would the Invisible Hand Handle Money?" * Kurt Schuler, "World History of Free Banking" Helmut Siekmann, "Deposit Banking and the Use of Monetary Instruments" |
| September 7 and 9 | History of electronic currency | * Clark, "The Long Road to Bitcoin" |
| September 14 and 16 | Basic economics of cryptocurrencies | * Dwyer, The Economics of Bitcoin and Similar Private Digital Currencies Böhme, et al., "Bitcoin: Economics, Technology, and Governance" |
| September 21 and 23 | Stablecoins | * Pernice et al., "Monetary Stabilization in Cryptocurrencies" Bullman et al., "In Search of Stability for Crypto-assets" |
| September 28 and 30 | Blockchains | * Dwyer, "Blockchain: A Primer" |
| October 5 and 7 | Blockchain and Economic Institutions | * Davidson et al. "Blockchains and the Economic Institutions of Capitalism." |
| October 12 | Fall break | |
| October 14 | Midterm | |
| October 19 and 21 | Go over exams | |
| October 26 to 28 | Decentralized finance | * Schär, "Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets", sections 1 and 2 |
| November 2 and 4 | DeFi and its Regulation | * Schär, "Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets", sections 3 and 4 * Dwyer, "Regulation of Cryptocurrencies" |
| November 9 and 11 | | * Malkiel, Chs. 1, 5, 7 Malkiel, Chs. 8, 9 |

Mackay, *Extraordinary Popular Delusions and the Madness of Crowds* pp. 89-97

November 16 and 18 Cryptocurrencies as an asset class

* Hougan and Lawant, "Cryptoassets"
Kayal and Rohilla, "Bitcoin in the Economics and Finance Literature: A Survey"

November 23 and 25 Thanksgiving

November 30 and December 2 Blockchain Success Stories

* Hargrave and Kanroupakis, Chapters 5 and 12

Final exam due December 8

READINGS ON CANVAS

All of these readings and some others are available on Canvas under "Files".

Hayek, F. A. 1976, 2007. *Denationalisation of Money*. Second edition (2007). London: Institute of Economic Affairs.

Friedman, Milton and Anna J. Schwartz. 1986. "Has Government Any Role in Money?", *Journal of Monetary Economics* 17, 37-62. Reprinted in *Money in Historical Perspective* by Anna J. Schwartz, pp. 289-314. University of Chicago Press: 1987.

Klein, Benjamin. 1974., "Competitive Supply of Money", *Journal of Money, Credit and Banking* 6 (4, November), 423-53.

Selgin, George A. and Lawrence H. White. 1994. "How Would the Invisible Hand Handle Money?" *Journal of Economic Literature* 32 (December), 1718-49.

Schuler, Kurt. 1992. "World History of Free Banking" in *The Experience of Free Banking* edited by Kevin Dowd, pp. 7-47. London: Routledge.

Seikmann, Helmut. 2016. "Deposit Banking and the Use of Monetary Instruments" in *Money and the Western Legal Tradition* edited by David Fox and Wolfgang Ernst, pp. 489-531. Oxford: Oxford University Press.

Clark, Jeremy. 2016. "The Long Road to Bitcoin." In *Bitcoin and Cryptocurrency Technologies* by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, pp. IX-XXVII. Princeton: Princeton University Press.

Dwyer, Gerald P. 2015. "The Economics of Bitcoin and Similar Private Digital Currencies", *Journal of Financial Stability*, 17 (April), 81-91.

Böhme, Rainer, Nicolas Christin, Benjamin Edelman and Tyler Moore. 2015. "Bitcoin: Economics, Technology, and Governance", *Journal of Economic Perspectives* 29 (Spring), 213-38.

Pernice, Ingolf G. A., et al. 2019. "Monetary Stabilization in Cryptocurrencies – Design Approaches and Open Questions." In *2019 Crypto Valley Conference on Blockchain Technology (CVCBT)*.

Bullman, Dirk, Jonas Klemm and Andrea Pinna. 2019. "In Search of Stability for Crypto-assets: Are Stablecoins the Solution?" ECB Occasional Paper Series, Number 230.

Dwyer, Gerald P. 2017. "Blockchain: A Primer." In *The Most Important Concepts in Finance*, edited by Benton E. Gup, pp. 12-27. Edward Elgar Publishing.

Davidson, Sinclair, Primavera De Filippi and Jason Potts. 2018. "Blockchains and the Economic Institutions of Capitalism." *Journal of Institutional Economics* 14 (4), 639-58.

Schär, Fabian. 2021. "Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets." Federal Reserve Bank of St. Louis *Economic Review*, Second Quarter, 153-174.

Dwyer, Gerald P. 2021. "Regulation of Cryptocurrencies." In *Understanding Cryptocurrency Fraud*, edited by Shaen Corbet. De Gruyter, 2021.

Zetzsche, Dirk A. Douglas W. Arner, and Ross P. Buckley. 2020. "Decentralized Finance." *Journal of Financial Regulation*. 6, 172-203.

Mackay, Charles (1841, 1852) *Extraordinary Popular Delusions and the Madness of Crowds* by Charles Mackay, pp. 89-97.

Hougan, Matt, and David Lawant. 2021. "Cryptoassets: The Guide to Bitcoin, Blockchain, and Cryptocurrency for Investment Professionals. CFA Institute Research Brief.

Kayal, Parthajit, and Purnima Rohilla. 2021. "Bitcoin in the Economics and Finance Literature: A Survey." *SN Business and Economics*, 1-88.

Hargrave, Sir John, and Evan Karnoupakis. 2020. *Blockchain Success Stories: Case Studies from the Leading Edge of Business*. O'Reilly Media.

From earlier years

Adhami, Saman, Giancarlo Giudici, and Stefano Martinazzi. 2018. "Why Do Businesses Go Crypto? An Empirical Analysis of Initial Coin Offerings." *Journal of Economics and Business* (100), 64-75.

Kiff, John, et al. 2020. "A Survey of Research on Retail Central Bank Digital Currency." IMF Working Paper 20/104.

Cunha, Paulo Rupino, Paulo Melo and Helder Sebastião. 2021. "From Bitcoin to Central Bank Digital Currencies: Making Sense of the Digital Money Revolution." *Future Internet*, 13, 1-19.

Engert, Walter, and Ben Siu-Cheong Fung. 2017. "Central Bank Digital Currency: Motivations and Implications." Bank of Canada Staff Discussion Paper, No. 2017-16, Bank of Canada.

IN CASE YOU WANT TO READ MORE, A FEW OF THE BETTER BOOKS:

Understanding Bitcoin

By Pedro Franco

Wiley, 2014.

A solid introduction to bitcoin that does not assume you are a programmer (although it helps to know some programming.) It is light on economics despite having the word in the subtitle. A little dated in its discussion of cryptocurrencies.

Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction

By Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder

Princeton University Press, 2016.

A computer-science textbook on cryptocurrencies. It is excellent but much of the material assumes nontrivial knowledge of pertinent computer-science and programming concepts.

Blockchain for Dummies, 3rd IBM Limited Edition

By Manav Gupta

John Wiley & Sons, Inc.

A nice introduction with about 40 percent of the 43 pages on IBM's involvement. Free, which is nice. Just look for it at IBM's website.

The Truth Machine: The Blockchain and the Future of Everything

By Michael J. Casey and Paul Vigna

St. Martin's Press, 2018

What are blockchains and what are they good for?

Bubble or Revolution? The Present and Future of Blockchain and Cryptocurrencies, 2nd edition

By Neel Mehta, Adi Agashe and Parth Detroja

Paravane Ventures

A breezy overview of cryptocurrencies and blockchains by Product Managers at Google, Microsoft and Facebook.

Blockchain Revolution

By Don Tapscott and Alex Tapscott

Portfolio

A business book on what people are doing with blockchains. Interesting, informative and easy to read, although a little dated now. (Originally published in 2016. I don't think the main text was updated in the 2018 paperback.)

Mastering Blockchain, Third edition

By Imran Bashir

Packt Publishing, 2020

This is a book that uses blockchain as the basis of the discussion of cryptocurrencies and smart contracts. It helps to know some programming.

Cryptoassets

by Chris Burniske and Jack Tatar

McGraw-Hill Education, 2018.

An interesting book that considers cryptocurrencies to be a new asset class.

VERBATIM STATEMENTS OF UNIVERSITY POLICY:

ACADEMIC INTEGRITY

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

STUDENTS WITH DISABILITIES

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to a class should let the instructor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848 or by emailing studentaccess@lists.clemson.edu. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their instructors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: <http://www.clemson.edu/campus-life/campus-services/sds/>.

TITLE IX

Clemson University is committed to providing a higher education environment that is free from sexual discrimination. Therefore, if you believe you or someone else that is part of the Clemson University community has been discriminated against based on sex, or if you have questions about Title IX, please contact the Title IX Coordinator Alesia Smith who is also the Executive Director of Equity Compliance, at 223 Holtendorff Hall, 864-656-3181. The Title IX Coordinator is the person(s) designated by Clemson University to oversee its Title IX compliance efforts.