



Course and Examination Fact Sheet: Spring Semester 2024

10,279: Blockchains and Cryptocurrencies

ECTS credits: 4

Overview examination/s

(binding regulations see below)

decentral - Presentation, Analog, Group work group grade (100%)

Examination time: Term time

Attached courses

Timetable -- Language -- Lecturer

[10,279,1.00 Blockchains and Cryptocurrencies](#) -- English -- [Biais Bruno](#)

Course information

Course prerequisites

Students need to have basic knowledge in microeconomics (expected utility maximization, rational expectations), game theory (Nash equilibrium, perfect Bayesian equilibrium), and mathematics (optimization, dynamic programming, probability).

Learning objectives

Students will get basic knowledge on blockchain and cryptocurrency and learn about theoretical analyses developed recently to analyze these innovations.

Course content

This course will provide an introduction to blockchain and cryptocurrencies. The goal is to offer both a description of blockchain and cryptocurrencies (what are they, how do they work, what can they be useful for) and a presentation of the stream of research which developed in parallel with these innovations.

The first part of the class will focus on blockchains, I will present i) a description of blockchain protocols, and ii) theoretical analyses of equilibrium in blockchain protocols.

The second part of the class will focus on cryptocurrencies, I will present i) a discussion of standard money and the way it is modeled in economics, and ii) a discussion of models of cryptocurrencies and models analysing their difference from and coexistence with standard currencies.

Course structure and indications of the learning and teaching design

1st day: Blockchain (1)

1. Blockchains and blockchain protocols
2. Equilibrium in the proof of work protocol

2nd day: Blockchain (2)

1. Equilibrium in the proof of stake protocol
2. Smart contracts

3rd day: OLG models of money and cryptocurrencies

1. OLG models of money



2. OLG models of cryptocurrencies

4th day: Continuous time models of money and cryptocurrencies

1. Money as implementation of optimal mechanism
2. Competition between private and public currencies

Student presentations will take place during the last lecture.

Course literature

Allais, M., 1947, *Economie et Intérêt*, Paris, Imprimerie Nationale.

d'Avernas, A., V. Maurin, Q. Vandeweyer, 2022, "Can Stablecoins Be Stable?" Becker Friedman Institute for Economics Working Paper No. 2022-131.

Benigno, P. L. Schilling and H. Uhlig, 2019, "Cryptocurrencies, Currency Competition, and the Impossible Trinity", University of Chicago, Becker Friedman Institute for Economics Working Paper No. 2019-108.

Biais, B., C. Bisière, M. Bouvard, C. Casamatta and A. Menkveld, 2023, "Equilibrium bitcoin pricing", *Journal of Finance*, pp 967_1014.

Cass, D., and K. Shell, 1983, "Do Sunspots Matter?", *Journal of Political Economy*, pp. 193-227.

Cong, W., J. Li, Wang, 2021, "Tokenomics: Dynamic Adoption and Valuation", *Review of Financial Studies* pp 1105-1155.

Garratt, R. and N. Wallace, 2018, "Bitcoin 1, bitcoin 2, ... An experiment in privately issued outside monies" *Economic Inquiry* pp 1887-1897.

Jevons, W.S., 1875, *Money and the Mechanism of Exchange*. London: Macmillan.

Kareken, J. and N. Wallace, 1981, "On the Indeterminacy of Equilibrium Exchange Rates", *Quarterly Journal of Economics*, pp. 207-222.

Kiyotaki and Wright, 1993, "A Search-Theoretic Approach to Monetary Economics", *The American Economic Review*, pp. 63-77.

Kiyotaki and Wright, 1989, "On Money as a Medium of Exchange," *The Journal of Political Economy*, pp. 927-54.

Kiyotaki, N., and J. Moore, 2001, "Inside money and liquidity", *Clarendon Lectures*, University of Oxford.

Kiyotaki, N., and J. Moore, 2002, "Evil is the root of all money", *Papers and Proceedings of the 104th meeting of the American Economic Association*, pp 62-66.

John, K., L. Kogan, F., Saleh, 2022, *Smart contracts and decentralized finance*, MIT Sloan Research Paper 6800-22

Lagos, L. and R. Wright, 2005, "A Unified Framework for Monetary Theory and Policy Analysis", *Journal of Political Economy*, pp. 463-484.

Lucas, R., 1978, "Asset Prices in an Exchange Economy," *Econometrica*, pp 1429-1446.

Mengers, K., 1892, "On the origin of money", *The Economic Journal*, pages 239-255.

Pagnotta, E., 2022, "Decentralizing money: bitcoin prices and blockchain security", *Review of Financial Studies*, pp 866-907.

Prat, J., and B. Walter, 2021, "An equilibrium model of bitcoin mining", *Journal of Political Economy*, pp 2415-2452.

Saleh, F., 2002, "Volatility and welfare in a cryptoeconomy," *Working paper*, McGill University.

Samuelson, P., 1958, "An exact consumption-loan model of interest with or without the social contrivance of money", *Journal of Political Economy*, pp 467-482.

Schilling, L. and H. Uhlig, 2019, "Some Simple Bitcoin Economics", *Journal of Monetary Economics*, pp. 16-26.

Smith, A, 1776, *The Wealth of Nations*. W. Strahan and T. Cadell, London.



Additional course information

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Examination information

Examination sub part/s

1. Examination sub part (1/1)

Examination modalities

Examination type	Presentation
Responsible for organisation	decentral
Examination form	Oral examination
Examination mode	Analog
Time of examination	Term time
Examination execution	Asynchronous
Examination location	On Campus
Grading type	Group work group grade
Weighting	100%
Duration	--

Examination languages

Question language: English

Answer language: English

Remark

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Examination-aid rule

Free aids provision

Basically, students are free to choose aids. Any restrictions are defined by the faculty members in charge of the examination under supplementary aids.

Supplementary aids

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Examination content

Students will make individual presentations based on recent research papers suggested in class.

Examination relevant literature

Research papers suggested by the lecturer.



Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW21) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 13 are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 04 (Thursday, 25 January 2024);
- Examination information (supplementary aids, examination contents, examination literature) for decentralised examinations: in CW 12 (Monday, 18 March 2024);
- Examination information (supplementary aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 13 (Monday, 25 March 2024);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: Starting with de-registration period in CW 15 (Monday, 08 April 2024).