

**Blockchains and Cryptocurrencies**

**Teacher:** Bruno Biais

**Duration:** 12 hours

**Number of ECTS credits:** 2

Education Level	Period	Language of instruction	Max. Staffing	Teaching Mode
Master	S2	English	25	in-person

**Deanship Department:** Finance

**Domain:** Finance and Economics

**Track:** Financial Economics

**Keywords :** Economics, Finance, Data, Innovation

**SYNOPSIS**

Blockchains are distributed (decentralized) ledgers. The major, and first, blockchain is Bitcoin, a ledger used to register ownership of cryptocurrency. But there are several other blockchains, that can rely on different protocols. We will describe the main blockchain protocols (involving proof of work and proof of stake) and, using the tools of game theory, analyze how and if blockchain participants can achieve consensus. We will also study cryptocurrencies and, using the tools of monetary theory, we will analyze if and how cryptocurrencies can be useful and valuable.

**DETAILED DESCRIPTION**

**Prerequisites:**

Microeconomics, Game Theory

**Course overview:**

What are blockchains and cryptocurrencies? Can they be useful? To address these questions, we will: i) Describe how blockchains work (protocols, participants, technologies, etc.) and ii) use economic theory and econometrics to analyze blockchains and cryptocurrencies.

**Principal Items:**

Blockchain, distributed ledgers, protocols, consensus, proof of work, proof of stake, cryptocurrency valuation

**Pedagogical Objectives:**

At the end of the class, students should have understood the workings of blockchain protocols, how game theory can be used to analyze interaction between participants in blockchains, and what insights this analysis delivers about the design and prospects of blockchain. Students should also have understood how monetary economics can be used and extended to study cryptocurrencies, and the insights this delivers into cryptocurrency pricing, volatility and prospects.

**Course organization:**

During the first three classes I will give lectures, to describe blockchain and cryptocurrencies, and present models. During the three following classes students will present empirical or theoretical research articles.

## TEACHING MATERIALS

Slides and papers

## TEACHING METHODS

Lectures, presentations

## WORK AND EVALUATIONS

### Work requested:

Presentations

### Assessment of achievement:

Tool/method of evaluation	Duration	Weight in the final grading
Paper presentation in class		100%

## BIOGRAPHY

Bruno Biais holds a PhD in finance from HEC, received the Paris Bourse dissertation award and the CNRS bronze medal. He taught at Toulouse, Carnegie Mellon, Oxford, LSE, and now HEC.

His research on finance, contract theory, experimental economics and blockchain is published in *Econometrica*, *Journal of Political Economy*, *American Economic Review*, *Review of Economic Studies*, *Journal of Finance*, *Review of Financial Studies* and *Journal of Financial Economics*.

He was editor of the *Review of Economic Studies* and of the *Journal of Finance*.

He is a fellow of the *Econometric Society* and the *Finance Theory group*.

He has been scientific adviser to the NYSE, Euronext, European Central Bank and Bank of England and is a member of the *European Systemic Risk Board*.

## WAIVER POLICY

None