



# FID3022 Blockchain Fundamentals: Technology and Applications 7.5 credits

Grunder i Blockchainteknik: Tekniker och tillämpningar

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for FID3022 valid from Spring 2019

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

Enrolled as a doctoral student.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After the course the student will be able to:

- Demonstrate systematic understanding of Blockchain and capacity to scholarly analyze and criticize interactions between all its components.
- Reflect on the ideas and technologies related to Blockchain with insight on its possibilities and limitations, as well as examine how it is currently used in society and evaluate how it can be used for new purposes and under different application domains.
- Identify the need for further knowledge in improving Blockchain technology with insights from the students own fields of research/interest.

## Course contents

This course will provide a comprehensive survey of topics relevant to Blockchain technology and to the ecosystem surrounding it. The course covers the main components that make Blockchain, starting from the basics of cryptography to the related aspects of game theory and economics. A solid understanding of Blockchain fundamentals is established by decomposing Bitcoin and building it from the bottom up, exploring and analyzing ideas behind the organization of its forming components. The course also surveys preceding technologies for digital currency and explains the relationship between crypto-currencies and Blockchains in order to build the full picture of the ecosystem surrounding blockchain technology. Participants in the course will be required to reflect on the arrangement of the different techniques, rules, and guidelines that form Blockchain and suggest possible extensions to the technology from their own research domains. Student presentations with in-depth discussions will be organized around specific topics relevant to Blockchains and their application under different domains.

## Disposition

The course is organized as a mixture of lectures and reading assignments with student presentations and discussions. The first half of the course will consist of a set of lecture sessions to build understanding of Blockchain fundamentals. The second half will be organized in a student presentation format, where participants will present and carry in-depth discussions of and reflections on selected related papers from the literature. During each session, students will:

- Make a review presentation of the findings on an assigned topic based on performed readings and literature review.
- Answer questions from the rest of the participants and actively participate in the discussion.

Towards the end of the course, every participant will be required to write a scientific report (e.g., vision article, critical review, survey) in which they summarize the state of the art on a topic of their choice that is related to Blockchain (e.g., limitations and potential of Blockchain technology, usage of Blockchain and potential societal impact, extension of Blockchain technology with knowledge from other fields, synthesis of Blockchain components, etc.) and critically reflect on the content.

## Course literature

Chapters from the following book will be used: *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*, by A. Narayanan, J. Bonneau, E. Felten, A. Miller, and S. Goldfeder. Princeton University Press, 2016.

Papers in the area of Blockchain and Blockchain applications from high-quality international venues will also be used.

## Equipment

N/A

## Examination

- EXA1 - Examination, 7.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

P/F

## Other requirements for final grade

The course will be assessed with a Pass/Fail grade, based on successful delivery of a presentation as well as a scientifically sound review report at the end of the course. In addition to this, a passing student must attend at least 75% of all lectures and 75% of all student presentation sessions.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.