Principles of Decentralized Ledgers
Courseguide 2021

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Part I
Course Layout

The course takes place in the second term — online on Zoom (`https://us02web.zoom.us/j/84238711677?pwd=bm5xZDlhOGlENFo3a1FCd3BoUzh5dz09`) — over a duration of 9 weeks, with 7 main lectures and 7 supporting lectures. The main lectures are pre-recorded, while the supporting lectures are scheduled on Tuesdays 9-10am UK time. The inaugural lecture is scheduled for the 19th of January 2020, at the Zoom link above.

The recorded lectures serve to primarily convey the main course contents. You can find these lectures on YouTube (`https://www.youtube.com/playlist?list=PLOa3v6xgsJullbz4uD13nm-U5D_cw0xLh`) as well as on Panopto for your convenience. The supporting lectures serve to discuss, for example about smart contract programming, relevant scientific papers, advances on course works as well as to elaborate and repeat on the contents provided within the main lecture.

1 Schedule

You can find the tentative course schedule in Table 1.

2 Grading Scheme

We plan the following course works, exam and grading scheme for this year's course.

Blockchain Workbench 10% of the grade

Blockchain dApp 10% of the grade

Exam 80% of the grade

19.01	Introduction Blockchain
26.01	Please watch lecture 1 until then. Coursework 1 start: Blockchain Workbench
02.02	Please watch lecture 2 until then. Paper Reading/Presentation by lecturer
09.02	Please watch lecture 3 until then. Blockchain Exam Exercises Due date for Coursework 1 Coursework 2 start: Decentralised Application
16.02	Please watch lecture 4 until then. Paper Reading/Presentation by lecturer
23.02	Please watch lecture 5 until then. Exercise Exam 2019
02.03	Please watch lecture 6 until then. Due date Coursework 2
09.03	Please watch lecture 7 until then. Summary Revision / Q&A (Optional)

Table 1: Tentative Course Schedule 2021.

Part II
Course works

This course will have two graded courseworks, (i) the blockchain workbench, and (ii) completing a decentralised application.

3 Blockchain Workbench

To complement the lectures, we will work through the blockchain workbench (`https://blockchainworkbench.com/`). The blockchain workbench covers the blockchain basics and allows to learn and practice the development of solidity based smart contracts. You will be expected to walk through the exercises of the workbench and share the resulting completion data blob upon finalization of the workbench. We will provide further instructions prior to the coursework start.

4 Decentralised Application

For the second coursework, we will give you a decentralised application that is not yet functional and needs to be completed. This could for instance be a

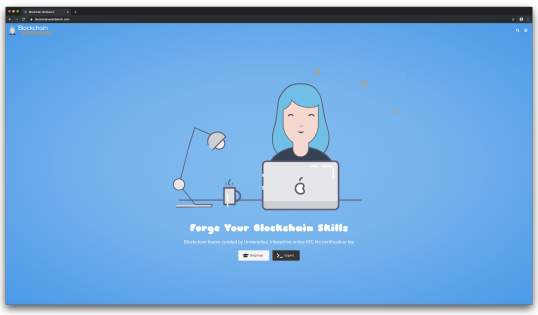

Figure 1: Blockchain Workbench landing page. Proceed as "Beginner".

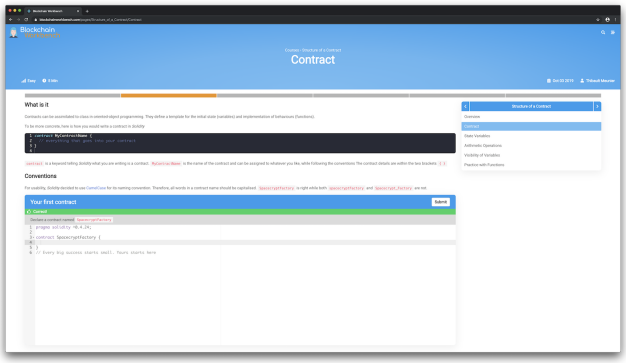

Figure 2: Smart contract IDE integrated into the web interface with editor, deploy and test scripts.

dApp which allows you to purchase and sell cryptomon cards and let them fight and breed. The full coursework description will be released at the courseworks' startdate.

You are expected to become more familiar and put into practice the development of a smart contract by completing missing functions within this application. We plan to provide you with a description of how to set up the application infrastructure. Your job will then be to fill in the missing elements to this application. Besides the tutorials of the blockchain workbench, you might find the following resource helpful: `https://solidity.readthedocs.io/en/develop/solidity-in-depth.html`.

5 Paper Reading/Presentation

The blockchain field is only 10 years old, and heavily driven by academic research results. To stay at the edge of this nascent technology we will review/discuss several academic, peer-reviewed papers (tentative list):

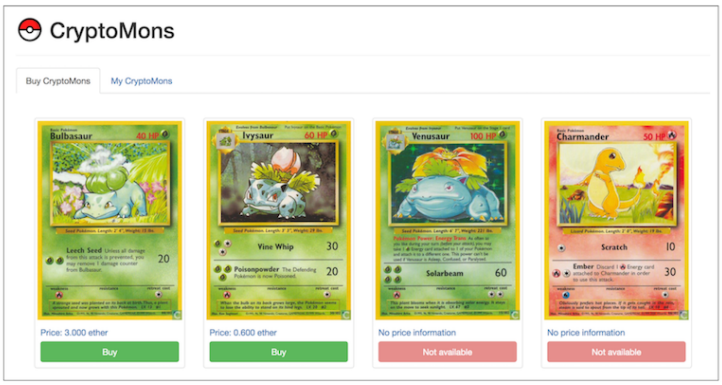

Figure 1: Screenshot of the marketplace where players can buy available CryptoMons

Figure 3: Cryptomons interface example.

- Bitcoin: A Peer-to-Peer Electronic Cash System by Sathoshi Nakamoto (`https://bitcoin.org/bitcoin.pdf`)
- On the security and performance of proof of work blockchains by Gervais et al. (`https://eprint.iacr.org/2016/555.pdf`)
- Majority Is Not Enough: Bitcoin Mining Is Vulnerable by Eyal and Sirer (`https://link.springer.com/chapter/10.1007/978-3-662-45472-5_28`).
- Do you need a Blockchain? by Gervais et al. (`http://doyouneedablockchain.com/`)

Part III
Exam

The exam will cover the topics and problems discussed within the lectures (i.e. not necessarily capture all contents of the papers that are being discussed/read, but the parts that are discussed within the lecture). We will have two lectures where we will work on (i) generic exam questions, and (ii) the exam of 2019.

Part IV
Administrative Comments

5.1 External Students – Registration for DoC Courses

1. Apply at: `https://dbc.doc.ic.ac.uk/externalreg/`
2. Then,
   - Your department's endorser will approve/reject your application
3. If approved,
   - DoC's External Student Liaison will approve/reject your application
4. If approved (again!),
   - Students will get access to DoC resources (DoC account, CATE, materials, ...)
   - No access after a few days? Check status of approval and contact relevant person(s)

Key Dates

- Exams for DoC $3^{rd}/4^{th}$ yr. courses take place at the end of the Term in which the course is taught
- Registration for exams opens end January

If in doubt, read the guidelines available at the link above :)