

**Discipline:** [Business & Information Systems Engineering]

### **1. Language**

English

### **2. Title**

Blockchain in Business Research

### **3. Lecturer**

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### **4. Date and Location**

13. – 16. October 2020

Goethe University, House of Finance, Westend Campus, Frankfurt am Main (room to be announced)

### **5. Course Description**

#### 5.1 Abstract and Learning Objectives

While blockchain-based applications such as Bitcoin are still in their infancy, a dramatic increase of industrial and academic interest in blockchain technology is evident. In addition, start-ups, as well as industry initiatives, are presently working intensely on blockchain-based innovations, making the technology one of the most promising drivers of innovation across many sectors and industries. However, understanding and designing of blockchain-based systems requires know-how in various areas, as well as mindful consideration of larger economic and societal issues. These objectives provide the starting point for this VHB Pro-Dok PhD seminar.

This course will focus on educating students in blockchain technology to develop conceptual as well as practical solutions and learn how to generate new theoretical insights based upon their research. The participants will learn how blockchain works and how it may disrupt or transform existing business models. They will gain insights into paradigmatic changes occurring from economic, organizational, and computer science viewpoints. As learning outcomes, the participants will receive insights how to conduct information systems research on blockchain that is innovative, rigorous, and relevant.

How is the course of interest for PhD students?

- Identifying research opportunities with leading edge technology
- Understanding how blockchain technology may interact with and affect the respective phenomenon of their interest
- Learning how to work in interdisciplinary settings with partners applying scientific methods on real-world problems
- Critically reflecting on their own PhD projects in the light of emerging blockchain research and generating academically sound, theoretical insights
- Writing a research paper on blockchain

## 5.2 Content

The course comprises sessions on the economics of blockchain, on blockchain governance, and on design-oriented blockchain research, in which cutting-edge research in these areas is presented and discussed. In the session on the economics of blockchain, students will learn how blockchain changes how we think about value creation and value capture, as well as economic theory more broadly. In the session on blockchain governance, participants will find out what blockchain governance is and how their research could contribute to advancing this field. In the session on blockchain and design, students will learn how to set up a blockchain development environment and how to work with the Ethereum blockchain. They will be able to design and implement their own smart contracts and will code their own DApps (decentralized apps). Once basic blockchain elements have been introduced, participants will work on their own blockchain research projects. The outcomes will be written papers that report on the progress of the research projects.

The course will conclude with a makeathon, where participants depending on their interest can either work on blockchain artifacts following a design science paradigm, or alternatively on other scientific papers on blockchain. Participants are encouraged to either work on projects that are already ongoing or start new projects. The goal will be to empower participants to develop promising research projects, and to optionally facilitate new research collaborations. The format is an intense collaborative prototyping and/or paper writing session, where participants self-organize to work under the mentorship of the organizer.

5.3 Schedule (including start and end time / Zeitplan (inkl. Start- und Endzeit))

Tuesday, October 13	Wednesday, October 14	Thursday, October 15	Friday, October 16
09:00 – 10:30 Welcome and introduction round, housekeeping	09:00 – 10:30 Paper session – Blockchain Economics (assigned literature)	09:00 – 10:30 Blockchain and Design Science Research	09:00 – 10:30 Paper development workshop (exercise & group work)
10:30 – 11:00 Coffee break	10:30 – 11:00 Coffee break	10:30 – 11:00 Coffee break	10:30 – 11:00 Coffee break
11:00 – 13:00 Introduction to Blockchain Foundations (lecture style)	11:00 – 12:30 Paper session – Blockchain Economics (assigned literature)	11:00 – 12:30 Ethereum DApp Development (exercise & group work)	11:00 – 12:30 Paper development workshop (exercise & group work)
13:00 – 14:00 Lunch break	12:30 – 14:00 Lunch break	12:30 – 14:00 Lunch break	12:30 – 14:00 Lunch break
14:00 – 15:30 Introduction to Blockchain Foundations (lecture style)	14:00 – 15:30 Paper session – Blockchain Governance (assigned literature)	14:00 – 15:30 Ethereum DApp Development (exercise & group work)	14:00 – 15:30 Paper development workshop (exercise & group work)
15:30 – 16:00 Coffee break	15:30 – 16:00 Coffee break	15:30 – 16:00 Coffee break	15:30 – 16:00 Coffee break
16:00 – 17:30 Literature research for own project on Friday (self-guided group work)	16:00 – 17:30 Paper session – Blockchain Governance (assigned literature)	16:00 – 17:30 Ethereum DApp Development (exercise & group work)	16:00 – 17:30 Wrap-up (summing up and farewell)

Literature analysis
  Plenary sessions
  Group work and exercise

#### 5.4 Course format

The course is structure into **plenary sessions, literature sessions, and group work & exercise sessions** and are colour coded (see above). The combination of different learning activities will intensify the outcome and help either students to develop their own research ideas further or allow to form co-author networks around ideas to write papers in the aftermath of the course. **Please keep in mind that handing in a paper after the VHB ProDok course is mandatory if you like to receive ECTS points for your work!**

### 6. Preparation and Literature

#### 6.1 Prerequisites

Students interested in participating in the course must be enrolled as PhD student in an information systems, business administration, computer science, economics, or other cognate program.

#### 6.2 Essential Reading Material

All students are expected to read the papers in 1. and 4. The paper in 2. and 3. will be distributed among the participating students.

Tuesday, October 13	Paper	Session
<b>1. Foundations</b>	1. Buterin (2014) 2. Böhme et al. (2015) 3. Nakamoto (2008) 4. Rossi et al. (2019)	Mandatory reading for <b>all participants</b>
Wednesday, October 14		
<b>2.1 Blockchain Economics</b>	5. Biais et al. (2019) 6. Catalini & Gans (2016) 7. Cong & He (2019) 8. Chiu & Koepl (2019) 9. Chong et al. (2019) 10. Davidson et al. (2018) 11. Foley et al. (2019) 12. Gandal & Halaburda (2016) 13. Li & Wang (2017) 14. Mai et al. (2018)	Paper presentation and discussion, as well as preparation of a one page "management summary" by <b>assigned participants</b> (15 to 18 minutes each)
<b>2.2 Blockchain Governance</b>	15. Andersen & Ingram (2019) 16. Bano et al. (2017) 17. Beck et al. (2018, pp. 1-29)	Paper presentation and discussion, as well as

	18. Bonneau (2018) 19. Cong et al. (2017) 20. DuPont (2018) 21. Du et al. (2019) 22. Miscione et al. (2019) 23. Saleh (2018) 24. Yin et al. (2019)	preparation of a one page “management summary” by <b>assigned participants</b> (15 to 18 minutes each)
<b>Thursday, October 15</b>		
<b>3. Blockchain and Design</b>	25. Chanson et al. (2019) 26. Nærland et al. (2017) 27. Notheisen et al. (2017)	Paper presentation and discussion, as well as preparation of a one page “management summary” by <b>assigned participants</b> (15 to 18 minutes each)
<b>4. Ethereum DApp Development</b>	28. Antonopoulos and Wood (2018) Mastering Ethereum: Building Smart Contracts and DApps	The book will be used as foundation for the exercise and is a recommended reading for <b>all participants</b> .
<b>Friday, October 16</b>		
<b>5. Paper Development Workshop</b>	29 Beck et al. (2018, pp. 29-35) 30. Constantinides et al. (2018, pp. 10-11) 31. Risius & Spohrer (2017)	Mandatory reading for <b>all participants</b>

### 6.3 To prepare

Participants will have to prepare the material assigned to them before the course takes place (see 6.2). The paper in 2. and 3. will be assigned among the participating students who will prepare a brief presentation based on the paper as well as literature they are supposed to identify. The brief presentation should be power point slides that have to be sent to the organisers before the course takes place.

## 7. Administration

### 7.1 Max. number of participants

The number of participants is limited to 20.

### 7.2 Assignments

Assignments to present papers will be made before the course takes place (see 6.3).

### 7.3 Exam

For those seeking ECTS points for their PhD program, a written homework needs to be handed in after the VHB ProDok seminar.

### 7.4 Credits

The course is eligible for 6 ECTS.

Activities	Hours
Reading and preparation of seminal and assigned literature	120
Preparation of presentations before the seminar	4
Active participation on the days of the seminar	24
Preparation of papers after the seminar	32
<b>Total</b>	<b>180</b>

## 8. References

Andersen, J. V., & Bogusz, C. I. (2019). Self-Organizing in Blockchain Infrastructures: Generativity Through Shifting Objectives and Forking. *Journal of the Association for Information Systems*, 20(9), 11.

Antonopoulos, A. M.; & Wood G. (2018). *Mastering Ethereum: Building Smart Contracts and DApps*, O'Reilly Media.

Bano S., A. Sonnino, M. Al-Bassam, S. Azouvi, P. McCorry, S. Meiklejohn, G. Danezis (2017) Consensus in the age of blockchains. Working Paper, University College London and The Alan Turing Institute, London.

Beck R., C. Müller-Bloch, J.L. King (2018) Governance in the blockchain economy: A framework and research agenda. *J. Assoc. Inform. Syst.* Forthcoming.

Biais, B., Bisiere, C., Bouvard, M., & Casamatta, C. (2019). The blockchain folk theorem. *The Review of Financial Studies*, 32(5), 1662-1715.

- Böhme R., N. Christin, B. Edelman, T. Moore (2015) Bitcoin: Economics, technology, and governance. *J. Econ. Perspect.* 29(2):213-238.
- Bonneau J. (2018) Hostile blockchain takeovers. *Proc. 5th Workshop Bitcoin Blockchain Res. (Bitcoin'18)*, Curaçao.
- Buterin, V. (2014). Ethereum White Paper. Retrieved May 25, 2017, from [http://www.the-blockchain.com/docs/Ethereum\\_white\\_paper-a\\_next\\_generation\\_smart\\_contract\\_and\\_decentralized\\_application\\_platform-vitalik-buterin.pdf](http://www.the-blockchain.com/docs/Ethereum_white_paper-a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf)
- Catalini C., J.S. Gans (2016) Some simple economics of the blockchain. Working paper, National Bureau of Economic Research, Cambridge: MA.
- Chanson, Mathieu; Bogner, Andreas; Bilgeri, Dominik; Fleisch, Elgar; and Wortmann, Felix (2019) "Blockchain for the IoT: Privacy-Preserving Protection of Sensor Data," *Journal of the Association for Information Systems*, 20(9), 10.
- Chiu, J., & Koepl, T. V. (2019). Blockchain-based settlement for asset trading. *The Review of Financial Studies*, 32(5), 1716-1753.
- Chong, Alain Yee Loong; Lim, Eric T. K.; Hua, Xiuping; Zheng, Shuning; and Tan, Chee-Wee (2019) "Business on Chain: A Comparative Case Study of Five Blockchain-Inspired Business Models," *Journal of the Association for Information Systems*, 20(9), 9.
- Cong, L. W., & He, Z. (2019). Blockchain disruption and smart contracts. *The Review of Financial Studies*, 32(5), 1754-1797.
- Cong L.W., Z. He, J. Li (2017) Decentralized mining in centralized pools. Working paper, University of Chicago, Chicago: IL.
- Constantinides P., O. Henfridsson, G.G. Parker (2018) Introduction: Platforms and infrastructures in the digital age. *Inform. Syst. Res.* 29(2):381-400.
- Davidson S., P. De Filippi, J. Potts (2018) Blockchains and the economic institutions of capitalism. *J. Institu. Econom.*, ePub ahead of print January 18.
- Du, W. D., Pan, S. L., Leidner, D. E., & Ying, W. (2019). Affordances, experimentation and actualization of FinTech: A blockchain implementation study. *The Journal of Strategic Information Systems*, 28(1), 50-65.
- DuPont Q. (2018) Experiments in algorithmic governance: A history and ethnography of 'The DAO,' a failed decentralized autonomous organization. M. Campbell-Verduyn, ed. *Bitcoin and Beyond: Cryptocurrencies, Blockchains, and Global Governance*, Routledge, Abingdon, UK, 157-177.
- Foley, S., Karlsen, J. R., & Putniņš, T. J. (2019). Sex, drugs, and bitcoin: How much illegal activity is financed through cryptocurrencies?. *The Review of Financial Studies*, 32(5), 1798-1853.
- Gandal, N., and Halaburda, H. 2016. "Can we predict the winner in a market with network effects? Competition in cryptocurrency market," *Games* (7:3), pp. 1-21.
- Gregor, S., & Jones, D. (2007). The anatomy of a design theory. *Journal of the Association for Information systems*, 8(5).
- Li X., C.A. Wang (2017) The technology and economic determinants of cryptocurrency exchange rates: The case of Bitcoin. *Decision Support Syst.* 95:49-60.
- Mai F., Z. Shan, Q. Bai, X. Wang, R.H. Chiang (2018) How does social media impact Bitcoin value? A test of the silent majority hypothesis. *J. Management Inform. Syst.* 35(1):19-52.

Miscione, G., Goerke, T., Klein, S., Schwabe, G., & Ziolkowski, R. (2019). Hanseatic Governance: Understanding Blockchain as Organizational Technology. *ICIS 2019 Proceedings*.

Nakamoto S. (2008) Bitcoin: A Peer-to-Peer Electronic Cash System. White paper, available at <https://bitcoin.org/bitcoin.pdf>.

Nærlund, K., Müller-Bloch, C., Beck, R., & Palmund, S. (2017). Blockchain to Rule the Waves – Nascent Design Principles for Reducing Risk and Uncertainty in Decentralized Environments. 38th International Conference on Information Systems (ICIS 2017). Seoul, South Korea.

Notheisen, B., Cholewa, J. B., & Shanmugam, A. P. (2017). Trading Real-World Assets on Blockchain. *Business & Information Systems Engineering*, 59(6), 425-440.

Risius M., K. Spohrer (2017) A blockchain research framework. *Bus. Inform. Syst. Engrg.* 59(6):385–409.

Rossi, M., Mueller-Bloch, C., Thatcher, J. B., & Beck, R. (2019). Blockchain Research in Information Systems: Current Trends and an Inclusive Future Research Agenda. *Journal of the Association for Information Systems*, 20(9), 14.

Saleh F. (2018) Blockchain without waste: Proof-of-stake. Working paper, New York University, New York.

Yin, H. H. Y., Langenheldt, K., Harlev, M., Mukkamala, R. R., & Vatrapu, R. (2019). Regulating cryptocurrencies: a supervised machine learning approach to de-anonymizing the bitcoin blockchain. *Journal of Management Information Systems*, 36(1), 37-73.