About this course

Blockchain technology is revolutionizing digitalization prospects for many industries and emerging as an exciting and rapidly growing field. By detailing the architecture of the technology, this course ensures that learners will be well versed in blockchain fundamentals. At the same time, it is designed to put learners on the leading edge by presenting the abstract nature of blockchain technology and emphasizing its broad applicability. Topics include the mathematical and cryptographic underpinnings of the technology, as well as mining, consensus protocols, networking, and decentralized governance. This course also features an extended case study called “How It Works at Dash.”

Required prior knowledge and skills

- Basic understanding of and coding experience with C++
- Proficiency in algebra

Learning Outcomes

Learners completing this course will be able to:
- Apply the Elliptic Curve Digital Signature Algorithm to identity management and computer security
- Determine the validity of chains given general consensus rules
- Determine whether changes in consensus rules for a Nakamoto network will result in a successful protocol fork
- Compare proof of work secured blockchains’ security to alternate security methods
- Evaluate an optimal mix of network design and operational parameters to ensure network scalability and throughput
- Evaluate the trade-off between security and computational complexity

Estimated Workload/Time Commitment Per Week

15 - 20 hours per week

Creators

Dragan Boscovic is a research professor in the School of Computing, Informatics, & Decision Systems Engineering (CIDSE), as well as Technical Director of CIDSE’s Center for Assured and Scalable Data Engineering and Distinguished Visiting Scholar, mediaX, at Stanford University. Dr. Boscovic also leads ASU’s Blockchain Research Lab, where his team’s mission is to advance the research and development of blockchain-based technologies for use in business, finance, economics, mathematics, computer science, and all other areas of potential impact.

He holds a Ph.D. in EE and CS, Numerical Electromagnetic Modeling from University of Bath, United Kingdom (1991) and a Magister in EE, eq. Ph.D., Microwave and Optoelectronics from University of Belgrade, Serbia (1988).
Dragan Boscovic has 25 years of high tech experience acquired in an international set up (i.e. UK, France, China, USA) and is uniquely positioned to help data-driven technical advances within today’s global data-intensive technology arena. He is a lateral thinker with broad exposure to a wide range of scientific methods and business practices and has a proven track record in conceiving strategies and managing development, investment and innovation efforts as related to advanced data analysis services, user experience, and mobile and IoT solutions and platforms.

Darren Tapp was involved in the development of Bitcoin and is now a researcher on the digital cash (cryptocurrency) development team at dash.org, a non-profit blockchain technology startup. He earned his doctorate in mathematics from Purdue University in 2007 and holds both a bachelor’s degree in physics and mathematics and a master’s degree in mathematics from the University of Kentucky. Most recently he has taught both on-ground and online at schools including Southern New Hampshire University, NHTI - Concord’s Community College, and Hesser College. He lives in New Hampshire, where he volunteers promoting STEM subjects to high-school-aged members of the Big Fish Learning Community.