UAB COLLEGE OF ARTS AND SCIENCES

Department of Computer and Information Sciences

Fall 2015
CS 493/693/793-9I: Cryptocurrency
Time: 5.00-7.30pm, Thursdays
Office Hours: 3.00-5.00pm, Thursdays
Instructor: Dr. Yuliang Zheng (yzheng@uab.edu)
Teaching Assistant: None

Course Description

Bitcoin, Ripple and other cryptocurrencies have attracted an enormous amount of attention from individuals, banks, hi-tech entrepreneurs, venture capitalists and governments as well as both cyber and physical criminals. Many technology visionaries consider these new types of digital currency as a disruptive technology whose impact on society in the coming decades would be comparable to what has been brought upon society by the Internet. The cryptocurrencies have also sparked interest from academic researchers, financial firms and technology vendors in applying blockchain and other underlying technologies for decentralized consensus to provide new solutions to an expanding array of problems, ranging from instantaneous, near-zero cost money transfer, smart autonomous contracts and distributed certification, to decentralized governance.

This new course will expose students to Bitcoin, Ripple and other notable cryptocurrencies. Topics to be covered include how a cryptocurrency works, blockchain and other decentralized consensus protocols, digital coin mining, security and privacy of cryptocurrencies, cryptographic techniques for digital currency, and applications of blockchain to smart contracts, financial exchanges and distributed autonomous organization.

Curriculum

Use of bitcoin
History of money
Cryptographic foundation
Untraceable digital cash
Blockchain and public ledge
Mining and distributed consensus
Security and privacy issues
Ripple and other alternative cryptocurrencies
Applications of blockchain

Prerequisites
Basic programming skills in Java or C++ are required.

Textbook
Andreas M. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media, Dec. 2014. Free online versions are available at:
1. http://chimera.labs.oreilly.com/books/1234000001802/index.html
2. https://github.com/aantonop/bitcoinbook

Recommended Readings
Technical
1. Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System", 2008, bitcoin.org.
2. Krzysztof Okupski, "Bitcoin Developer Reference (working paper)", Dec. 2014, https://github.com/minium/Bitcoin-Spec/blob/master/Bitcoin.pdf
3. "Bitcoin Improvement Proposals", https://github.com/bitcoin/bips#readme
4. Pedro Franco, "Understanding Bitcoin: Cryptography, Engineering and Economics", Wiley, Nov. 2014.
5. Mark D. Flood and Oliver R. Goodenough, "Contract as Automaton: The Computational Representation of Financial Agreements", March 26, 2015. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2538224
6. Princeton University, "BTC-Tech: Bitcoin and Cryptocurrency Technologies", Spring 2015, https://piazza.com/princeton/spring2015/btctech/resources
7. Ethereum White Paper, "A Next-Generation Smart Contract and Decentralized Application Platform", https://github.com/ethereum/wiki/wiki/White-Paper

Non-technical
1. Melanie Swan, "Blockchain: Blueprint for a New Economy", O'Reilly Media, Jan. 2015.
2. Paul Vigna (Author), Michael J. Casey, "The Age of Cryptocurrency", St. Martin's Press, Jan. 2015.
3. PWC, "Money is No Object: Understanding the Evolving Cryptocurrency Market", http://www.pwc.com/en_US/us/financial-services/publications/assets/pwc-cryptocurrency-evolution.pdf

Web sites (technical)
1. https://bitcoin.org/en/
2. https://en.bitcoin.it/wiki/Category:Technical

Web sites (news)
1. http://www.coindesk.com/
2. https://bitcoinmagazine.com/
3. http://bitcoinist.net/

Bitcoin App Development
Students are recommended to purchase the following e-book ($9.99):
M. Farghaly, "Bitcoin Programming", 2014.
https://gumroad.com/l/Bitcoin-Programming-book (eBook for $10).

Important Dates
Last day to drop: 8/31/2015
Mid-term exam: 10/1/2015
Last day to withdraw with "W": 10/23/2015
Fall/Thanksgiving break: 11/23-27/2015
Final exam (tentative):   7.00-9.30pm, 12/10/2015
[Official exam schedule: https://www.uab.edu/students/academics/academic-calendar/final-exams]

Grading
Assignments: 40%
Midterm: 20%
Final: 30%
Classroom participation: 10%

Grading Policy

In general, the marking scheme for this class will be as follows:

A = 90-100; B = 80-89; C = 70-79; D = 55-69; F = below 55.

These standards may be adjusted for certain exams or homework. These adjustments will be announced in class as the exam/homework is handed back.

UAB Academic Honor Code

https://www.uab.edu/students/academics/honor-code

The University of Alabama at Birmingham expects all members of its academic community to function according to the highest ethical and professional standards. Students, faculty, and the administration of the institution must be involved to ensure this quality of academic conduct.

Academic misconduct undermines the purpose of education. Such behavior is a serious violation of the trust that must exist among faculty and students for a university to nurture intellectual growth and development. Academic misconduct can generally be defined as all acts of dishonesty in an academic or related matter.

Academic dishonesty includes, but is not limited to, the following categories of behavior:

- ABETTING is helping another student commit an act of academic dishonesty. Allowing someone to copy your quiz answers or use your work as their own are examples of abetting.

- CHEATING is the unauthorized use or attempted use of unauthorized materials, information, study aids, the work of others, or computer-related information.

- PLAGIARISM means claiming as your own the ideas, words, data, computer programs, creative compositions, artwork, etc., done by someone else. Examples include improper citation of referenced works, the use of commercially available scholarly papers, failure to cite sources, or copying another person's ideas.

- FABRICATION means presenting falsified data, citations, or quotations as genuine.

- MISREPRESENTATION is falsification, alteration, or the misstatement of the contents of documents, academic work, or other materials related to academic matters, including work substantially done for one class as work done for another without receiving prior approval from the instructor.

Violations of the UAB Academic Honor Code are punishable by a range of penalties, from receiving a failing grade on an assignment to an F in the course to dismissal. Any course grade of F for academic misconduct supersedes any other grade or notation for that class. Withdrawal from a course while a possible violation of the Academic Honor Code is under review will not preclude the assignment of a course grade that appropriately reflects the student's performance prior to withdrawal if the violation is substantiated.