IST 408/608 Blockchain Management
Tuesdays & Thursdays, 12:30-1:50pm, Hinds 021

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Office Hours Tuesdays 3-5:30pm

Prerequisite / Corequisite: None

Faculty Assistant: Tom Montfort, tjmontfo@syr.edu, 973-407-9310 (feel free to text)
Office Hours: Fridays 2-4pm in the Blackstone Launchpad (glass box on first floor of Bird Library)

Audience: 408: Undergraduate School of Information Studies, **and** Students from other schools and colleges are welcome. 608: Graduate M.S. Information Systems, Applied Data Science, Library and Information Science, PhD/DPS/Law **and** Students from other schools and colleges are welcome.

Description

Students complete distributed ledger labs before developing, implementing, and "Demo or Die" sharktanking their own new blockchain project. Blockchain concepts such as decentralization, smart contracts, trust, and consensus governance are discussed.

Additional Course Description

The course can be counted toward an iSchool Certificate in Data Science or Certificate in Information Security. Blockchain or distributed ledger technology is disrupting currency, property, financial, healthcare, energy, and other markets–or will likely do so over the coming decades. Information professionals, university faculty, student researchers, entrepreneurs, coders, software engineers, cloud managers, and architects are avidly engaging in emerging opportunities. Enthusiasts, speculators, accredited investors, venture capitalists, banks, and many NFT (non-fungible token) and "fintech" (financial technology) industry start-ups are placing bets on early winner and loser solutions.

Established market leaders are exploring a wide range of applications and uses of a secure "immutable" technology initially developed to underlie the virtual/cryptocurrency Bitcoin. Wide interest in an innovation does not assure success. Early investors have lost everything from blockchain exchanges multiple times. Entrepreneurs have paid steep penalties, including incarceration for money-laundering, for serving blockchain markets without awareness or conformance to legal requirements. Governments and regulators are applying existing and new regulations and law to these technologies and new markets. Meanwhile "govtech" entrepreneurs are developing methods for automating governance, risk, and compliance that should work for distributed ledger ecosystem partners and conform to legal requirements. They promise.

This course introduces students to key concepts such as trust and consensus, as well as the technologies utilized by alternative blockchains and cryptocurrencies. Management and governance processes for consensus and legal and regulatory issues for distributed ledger technology are also addressed. Students will learn through labs, readings, and class discussion how trust and then consensus has been achieved and may be maintained with autonomy. This may be done more or less well and is critical for enabling widely distributed and disparate parties to participate in public and private blockchain market creation. Distributed ledger technology innovation, trust establishment and maintenance, iterative consensus development, and autonomy in use resulting from the prior conditions being fulfilled and maintained will all be explored.

Credits: 3

Learning Objectives

IST 408/608 Blockchain Management is about the emergence of distributed ledger technology and its management for business operations. Consensus, trust, governance, risk, and compliance—and more generally policy, regulation, and legal issues, such as smart contracts affecting distributed ledger innovations—will be introduced. Their application in ICOs (initial coin offerings) and asset tokenization will be reviewed.
Initially introduced as the special sauce enabling the virtual currency/property/digital asset market for Bitcoin, the potential applications of blockchain distributed ledger technology appear to be innumerable, creating many exciting professional opportunities for students to pursue.
This course teaches you about much more than cryptocurrencies. Core learning objectives are student mastery of how to

- create
- analyze
- use
- manage
- govern

blockchain distributed ledger applications.

Bibliography/Texts/Supplies—Required for 408

Drescher, D. (2017). *Blockchain basics: A non-technical introduction in 25 steps*. APress LLC/Springer Science + Business New York. ISBN-10: 1484226038; ISBN- 13: 978-1484226032; DOI: 10.1007/978-1-4842-2604-9. Available from the Syracuse University Bookstore. We suggest the e-book version for affordability. Or from: https://www.amazon.com/Blockchain-Basics-Non-Technical-IntroductionSteps/dp/1484226038/ref=sr_1_3?crid=11GT7MXBUE3NE&keywords=blockchain+basics&qid=1579036339&s=books&sprefix=blockchain+%2Caps%2C165&sr=1- 3

Bibliography/Texts/Supplies—Required for 608; Recommended for 408

Drescher's *Blockchain Basics* + …..

Antonopolous, A. M., & Wood, G. (2018) *Mastering Ethereum: Building smart contracts and DApps*. O'Reilly. ISBN-13: 978-1491971949; ISBN-10: 1491971940. Available from the Syracuse University Bookstore. We suggest the e-book version for affordability. Or from: https://www.amazon.com/Mastering-Ethereum-Building-Smart- Contracts/dp/1491971940

Werbach, K. (2019) *The blockchain and the new architecture of trust*. MIT Press, ISBN10: 0262038935, ISBN-13: 978-0262038935. Available from the Syracuse University Bookstore. We suggest the e-book version for affordability. Or from: https://www.amazon.com/Blockchain-Architecture-Trust-InformationPolicy/dp/0262038935/ref=sr_1_1?crid=JIFQ2JKMQEKV&keywords=kevin+werbach+the+blockchain+and+the+new+architecture+of+trust&qid=1565718349&s=books&sprefix=kevin+werbach+%2Cdigital-text%2C138&s

Bibliography/Texts/Supplies—Additional

Recommended hands-on, self-paced programming "how-to": Especially for students with limited (or no) prior coding, scripting, and/or software engineering experience, we find Blockchain Management students who take the time to advance their basic programming knowledge and skills find completing course labs much less painful and the class project far more rewarding. Even if you do not want to write code yourself in your future career, knowing just enough programming to help manage or lead continuous integration/continuous delivery blockchained cloud-to-edge solution teams will be extremely helpful and rewarding; your future employers would all agree.

HTML and CSS for beginners: https://www.codecademy.com/a/tracks/html

Introduction to JavaScript: https://www.udacity.com/course /intro-to-javascript--ud803

Introduction to Node.js: https://www.edx.org/course/introduction-node-js-microsoft- dev283x

Learn to code Ethereum DApps: https://cryptozombies.io/

Recommended Books:

Shermin Voshmgir, (2020) *Token Economy: How the Web3 reinvents the Internet*, 2nd edition, **ISBN-13:** 978-3982103815; **ISBN-10:** 3982103819

Pristy, N. (2017). *Building blockchain projects: Building decentralized blockchain applications with Ethereum and Solidity*. Packt Publishing. ISBN-10: 178712214X; ISBN-13: 978- 1787122147; https://www.amazon.com/Building-Blockchain-Projects- decentralizedapplications/dp/178712214X. (Refer to GitHub repository of author for accessing the code present in the book: https://github.com/PacktPublishing/Building- Blockchain-Projects.)

Etwaru, R. (2017). *Blockchain trust companies: Every company is at risk of being disrupted by a trusted version of itself.* Dog Ear Publishing. SU bookstore link for orders: http://bookweb.syr.edu/ePOS/form=cat.html&cat=993&store=1

Bahga, A. (2017). Blockchain applications: A hands-on approach. VPT. ISBN- 10: 0996025553; ISBN-13: 978-0996025553. https://www.amazon.com/Blockchain- ApplicationsHands-Arshdeep-Bahga/dp/0996025553

Gaur, N. *Hands-on blockchain with Hyperledger*. ISBN-13: 9781788994521. https://www.packtpub.com/big-data-and-business-intelligence/hands-blockchain- hyperledger

Requirements

Readings on virtual markets and organizations, computer-supported cooperative work, sociotechnical, decentralized, distributed, and cryptographic systems will support student achievement of these learning objectives.

The hands-on labs are critical for students developing a deeper understanding of the range of factors affecting blockchain management and the confidence that they can use and manage blockchain services.

The midterm contributes to achieving all learning objectives. By reviewing labs, readings, and class sessions in preparation for the exam, students confirm they have learned not only about blockchain application creation, use, management, and governance but how they function together in a decentralized environment.

The class team project produces a graded research paper, presentation, demo, and poster, which confirms you can indeed create, use, and manage a blockchain application, at least to the extent of a live demonstration of your teams' running "smart contract." "Create" is the highest learning objective because it confirms your full mastery of the subject of blockchain management.

For all written assignments, please use 12-point font and APA style. Group project papers should be about 10-15 pages long, depending on the size of your team. Larger teams should elaborate more. You should aim for your groups to consist of about 3-5 people. If you would like a team of more or fewer, please discuss with your instructor first.

In-class experiential learning to help students achieve learning objectives includes interaction with senior industry executives from KPMG and other leading firms, as well as entrepreneurs and investors, and will also test students achievement of the "blockchain governance" learning objective. They provide feedback on your class projects during the two synchronous "sharktanks."

Grading

For IST 408

Participation*	**10 pts**
3 Labs* 11 points/lab	**33 pts**
Midterm exam	**12 pts**
Midterm "concept" Sharktank presentation	**6 pts**
2- to 4-page concept paper (completed after feedback from sharks)	**6 pts**
Final project term paper	**20 pts**
Final presentation, demo, and poster	**14 pts**
Total	**101 pts**

For IST 608

Participation*	**10 pts**
4 Labs* 8 points/lab	**32 pts**
Midterm exam	**12 pts**
Midterm "concept" Sharktank presentation	**6 pts**
2- to 4-page concept paper (completed after feedback from sharks)	**6 pts**
Final project term paper	**20 pts**
Final presentation, demo, and poster	**14 pts**
Total	**100 pts**

*Are individually graded assignments. For 408 students, each or your 3 Labs is worth 11 points. Students on a team will usually receive the same grade, unless the instructor recognizes a significant imbalance in the quality and/or quantity of team contributions.

Syracuse University grading policy follows:

Grades	**Grade Points per Credit**
A	4.0
A–	3.6666
B+	3.3333
B	3.0
B–	2.6666

Course-Specific Policies (on attendance, late work, makeup work, examinations if outside normal class time, etc.)

Completing labs may be challenging; the instructor is flexible within reason on late work. Because of the importance of team collaboration in the cocreation and analysis of your blockchain application, the instructor expects all team members to be both flexible and committed to the collective team achievement of all learning objectives.

Additional Information

As there is a great deal happening in the industry, evidenced by the high demand and earnings of blockchain developers, students are welcome to bring current news including recent developments in digital currencies into class discussions and suggest supplemental video viewing or readings.

Academic Integrity Policy

Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The pilot policy in effect at the School of Information Studies defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The pilot policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The pilot policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the pilot policy, students found in violation are subject to grade sanctions determined by the course instructor and nongrade sanctions determined by the School or College where the course is offered. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during preterm check-in on MySlice. For more information and the pilot policy, see http://academicintegrity.syr.edu .

Course-Specific Policy on the Use of Turnitin

This class will use the plagiarism-detection and -prevention system Turnitin. You will have the option to submit your papers to Turnitin to check that all sources you use have been properly acknowledged and cited before you submit the paper to me. I will also submit all papers you write for this class to Turnitin, which compares submitted documents against documents on the internet and against student papers submitted to Turnitin at SU and at other colleges and universities. I will take your knowledge of the subject matter of this course and your writing level and style into account in interpreting the originality report. Keep in mind that all papers you submit for this class will become part of the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers.

Disability-Related Accommodations

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), disabilityservices.syr.edu, located at 804 University Avenue, room 309, or call 315.443.4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability- related accommodations and will issue "Accommodation Authorization Letters" to students as appropriate. Because accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible. Our goal at the iSchool is to create learning environments that are useable, equitable, inclusive, and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please meet with me to discuss additional strategies beyond official accommodations that may be helpful to your success.

Religious Observances Notification and Policy

SU's religious observances policy, found at supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students should have an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors no later than the end of the second week of classes through an online notification form in MySlice listed under **Student Services/Enrollment/My Religious Observances/Add a Notification**.

Student Academic Work Policy

Student work prepared for University courses in any media may be used for educational purposes, if the course syllabus makes clear that such use may occur. You grant permission to have your work used in this manner by registering for, and by continuing to be enrolled in, courses where such use of student work is announced in the course syllabus. I intend to use academic work that you complete this semester for educational purposes in this course during this semester. Your registration and continued enrollment constitute your permission. I intend to use academic work that you complete this semester in subsequent semesters for educational purposes. Before using your work for that purpose, I will either get your written permission or render the work anonymous by removing all your personal identification.

Course Evaluations

There will be an end-of-course evaluation for you to complete this term, described below. This evaluation will be conducted online and is entirely anonymous. You will receive a notification

from the Syracuse University Office of Institutional Research & Assessment (OIRA) department in your email account with the evaluation website link and your passcode.

> End-of-semester evaluation will be available for completion in Week 10 prior to your final exams week. This evaluation is slightly longer, and it is used to gauge the instructor performance and make adjustments to the course to ensure it meets our student needs.

We faculty work hard to do the best possible job when preparing and delivering courses for our students. Please understand that not only does the school use the course evaluations to make decisions about the curriculum in order to improve where necessary, but they also use them to make decisions about faculty members. Please take the time and fill out this evaluation as your feedback and support of this assessment effort is very much appreciated.

School Library Media Program Assessment

The School Library Media Program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) through the Syracuse University School of Education. As a part of that accreditation, the School Library Media Program must assess student performance on the competencies that correlate to program outcomes. The competencies that are assessed are identical to the items on your Competency Checklist. As a part of School Library Media Program planning, course-embedded assessments have been aligned with student competencies. For CAEP reporting, each faculty member with competency-based, course-embedded assessments is asked to rate (1=Ineffective, 2=Developing, 3=Effective, or 4=Highly Effective) candidates' performance on the respective competencies. This is the same rating scale students use when completing the competency checklist. Scoring is conducted for key assignments and not all assignments for a course.

What this means for you:
Your individual score is NOT a grade; it is part of an aggregate report. If a student is performing at an Ineffective or Developing level, a comment is submitted with the score, which is also aggregated. Individual scores and comments are not associated with specific student name.

Week/ Class/ Date	Lecture Topics & Learning Objectives	Required Reading	Assignment Deadlines
1 1.17	Introduction to Course Learning Objectives, Structure, Final Project Roadmap	Kimberly Underwood, *Is Blockchain Ready for Primetime?*, in ***Signal***, August 2019, Volume 73, No. 12, https://www.afcea.org/content/blockchain-ready- prime-time	
1 1.19	Intro to ledgers, contracts, inter-party trust.	***Blockchain Basics***, Ch. 1	***Blockchain Basics***, Ch.1 Reading Groups formed
2 1.24	Virtual and Crypto Currency Markets	***Basics, ch 2;*** Robert Ackerman, *'Utility Criteria Determine Blockchain Applicability*,' in ***Signal***, August 2019, Volume 73, No. 12, https://www.afcea.org/content/utility-criteria-determine-blockchain-applicability ***Required for 608:*** ***Blockchain and the New Architecture of Trust*****,** Introduction + Chapter 1: The Trust Challenge	Basics, Ch 2
2 1.26	Blockchain Basics Terminology	Basic Understanding of Smart Contracts, Solidity, MIST, and Other Fundamental Concepts and Tools *608: Mastering Ethereum*, Chapter 1: What Is Blockchain? **Students needing to review/learn (some) node.js: please also do Lab I: Building a basic application with Ethereum** https://www.udemy.com/blockchain- application/	*Blockchain Basics*, Chapter 3 Lab 1 Assigned: **Space Doggo**
3 1.31	Crypto History & Satoshi Nakomoto	KPMG. (2018). Institutionalization of crypto Assets https://assets.kpmg/content/dam/kpmg/us/pdf/2018/11/institutionalization-cryptoassets.pdf *608: Blockchain and the New Architecture of Trust*, Chapter 2: Satoshi's Solution; Chapter 3: More Than Money. *Mastering Ethereum*, Chapter 2: Ethereum Basics, Chapter 3: Ethereum Clients	*Blockchain Basics*, Chapter 4 Please keep working on Lab I!

3 2.2	Encryption & Distributed Ledgers	KPMG. (2020). Cracking crypto currency. https://advisory.kpmg.us/content/dam/advisory/en/pdfs/2020/kpmg-cracking-crypto-currency.pdf	**Group 1** *Blockchain Basics*, Chapters 5-7
4 2.7	Proof of Work, Proof of Stake, and Public/ Private Ledgers	*Blockchain Basics*, Chapters 5–7 **Lab 2 discussed** **608:** *Blockchain and the New Architecture of Trust,* Chapter 4: Why Blockchain? *Mastering Ethereum*, Chapter 4, Cryptography	*Blockchain Basics*, Chapters 8-9
4 2.9	Immutability, Hashing + Consensus	**Course project brainstorm/scrum team goal-setting** (Students participate in class ready to share a few ideas of what interests you as a possible class project, which we could build on (a) blockchain. *Blockchain Basics*, Chapters 8-9 608: *Arch Trust***:** ch. 5 *Mastering Ethereum*: ch. 5-6	*Blockchain Basics*, Chapters 10-11 **Lab I Due (2/10 @ 11:59pm)**
5 2.14	Layers & Ledgers	Discuss/Finalize Teams *Blockchain Basics*, Chapters 10-11 608: *Arch Trust***:** ch. 6 *Mastering Ethereum*: ch. 7-8	*Blockchain Basics*, Chapters 12-13 **Lab 2.1 Assigned; Intro to Remix IDE** **Case Study Group 2**
5 2.16	PoW, PoS, + DPoS, PoA & More	*Blockchain Basics*, Chapters 12-13 608: *Arch Trust***:** ch. 7 *Mastering Ethereum*: ch. 9-10	**Case Study Group 3** *Blockchain Basics*, Chapters 14-15 *Keep working on Lab 2.2*
6 2.21	Hyperledger	Prepare for Concept Sharktank with Blackstone LaunchPad assistance *Blockchain Basics*, Chapters 14-15 608: *Arch Trust***:** ch. 8 *Mastering Ethereum*: ch. 11-12	**Lab 2.1 due 24 hours before Week 6 2.21 class** **Lab 2.2 assigned** *Blockchain Basics*, Chapters 16-17
6 2.23		Concept Sharktank Pt 1	*Keep working on Lab 2.2*

7 2.28		Concept Sharktank Pt 2	*Keep working on Lab 2.2*
7 3.2	Consensus & Oracles	Review & Discuss Feedback; *review team plans for Class Projects* *Blockchain Basics*, Chapters 16-17 608: *Arch Trust*: ch. 9 *Mastering Ethereum*: ch. 13-14	**Case Study Group 4** ***Lab 2.2 Due*** ***Lab 3 Assigned*** *Blockchain Basics*, Chapters 18-19
8 3.7	Decentralized Autonomous Organizations	What Not to Do https://coinmarketcap.com/alexandria/article/a-history-of-the-dao-hack https://thedefiant.io/starting-a-dao-in-the-usa-steer-clear-of-dao-legislation	
8 3.9	Digital Asset Regulation	US Federal Crypto Framework https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/16/fact-sheet-white-house-releases-first-ever-comprehensive-framework-for-responsible-development-of-digital-assets/	
3.12- 3.19	NO CLASS	SPRING BREAK	*Relax! :)*
9 3.21		*Exam discussion/review* *Blockchain Basics*, Chapters 18-19 608: *Arch Trust*: ch. 10 *Mastering Ethereum*: ch. 15-16	**Lab 3 Due** ***Lab 4 assigned for 608*** *Blockchain Basics*, Chapters 20-21
9 3.23		Mid-Term exam *Exam assesses understanding of concepts covered in class lectures, readings 1.13-3.22*	*Blockchain Basics*, Chapters 22-23
10 3.28	Consensus revisited	What consensus can we draw on truth: SBFT *Blockchain Basics*, Chapters 22-23	**Case Study Group 5** *Blockchain Basics*, Chapters 24-25
10 3.30	*DApps Markets*	*Blockchain Basics*, Chapters 24-25	***Lab 4 due for 608 students***
11 4.4	*NFT Markets*	Non-Fungible Tokens https://www.sciencedirect.com/science/article/abs/pii/S0007681321002019 https://www.mdpi.com/2227-7390/10/17/3218/htm	**Case Study Group 6**
11 4.6	DeFi Markets	Decentralized Finance https://www.brookings.edu/wp-content/uploads/2022/03/SP22_BPEA_MakarovSchoar_conf-draft.pdf	**Case Study Group 7**

12 4.11	CBDC Markets	Central Bank Digital Currencies https://www.atlanticcouncil.org/cbdctracker/	
12 4.13	VMware Blockchain	Simplified Byzantine Fault Tolerance: VMware Blockchain & Lab; and DIEM VMware Blockchain is a new open fabric for creating and managing fast scalable blockchain applications and services; and powers DIEM, the Facebook-backed digital currency.	https://research.vmware.com/projects/vmware- blockchain https://research.vmware.com/publications/flexibl e-byzantine-fault-tolerance https://research.vmware.com/publications/mind- the-mining
13 4.19	VMware Lab	http://docs.hol.vmware.com/H OL-2020/hol-2088-01-emt html en/	
14 4.18		Final Project Teams & Concepts Review **Practice presentations & feedback + in-class hands-on group work on project**	
14 4.20		FINAL SHARKTANK Practice W Blackstone LaunchPad alum feedback	*Phillip McKnight, Ghostfruit,*
15 4.25		Demo or Die Sharktank Pt 1	
15 4.27	LAST CLASS	Demo or Die Sharktank Pt 2	
16 5.1	Reading/Exam Week(s)	Completed team *Research Paper, Presentation w. Video & Poster on* technical and business viability of student work ALL ASSIGNMENTS TO BE SUBMITTED (INCLUDNG POSTER & PRESENTATION/ DEMO CODE)	**Final Assignments Due May 5**