Course Catalog Summary

Blockchain distributed ledger technology is disrupting currency, property, financial, healthcare, energy, and other markets – or will likely do so over coming decades. Information professionals, university faculty and student researchers, entrepreneurs, coders and software engineers, cloud managers and architects are avidly engaging in emerging opportunities. Enthusiasts and speculators, accredited investors, venture capitalists, banks and many ‘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 underlay the virtual/crypto-currency Bitcoin.

Wide interest in an innovation does not assure success. Early investors 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 regulations and law to these technologies and new markets, with however presently limited experience typically. Meanwhile ‘govtech’ entrepreneurs are developing methods for automating governance, risk and compliance that should work for distributed ledger ecosystem partner, 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. 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.
**Course Description and Objectives**

IST 600 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 Distributed Autonomous Organizations will be addressed. Initially introduced as the special sauce enabling the virtual currency/property 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 Bitcoin: how to create, analyze, use, manage, and govern blockchain distributed ledger exchanges, technologies, applications, and services. Readings on virtual markets, virtual organizations, computer-supported cooperative work, sociotechnical and distributed, and cryptographic systems will provide students with a wider view and deeper understanding of the range of factors affecting blockchain management. This wider view is helpful for both grounding your class research paper, and for providing a basis for your class projects. Your in-class experiential learning will include several labs, and interaction with senior industry executives and entrepreneurs. Applications within and between institutions, including Distributed Autonomous Organizations in enterprise, healthcare, utility and many other markets will be reviewed as use case examples. Students receive feedback from industry leaders on their course projects in two in-class ‘sharktanks’.

**About the Co-Instructors**

Lee W McKnight is an Associate Professor in the Syracuse University School of Information Studies, and an Affiliate of INSCT, the Institute for National Security and Counter-Terrorism, College of Law/Maxwell School. Since 1998, Lee lectures annually at MIT on innovation. [https://ischool.syr.edu/people/directories/view/lmcknigh/](https://ischool.syr.edu/people/directories/view/lmcknigh/)

Richie Etwaru is Chief Digital Officer, IQVIA, and Adjunct Professor, Syracuse University School of Information Studies. Previously Richie was in Office of the CIO, UBS. He is the author of *Blockchain Trust Companies. Every Company is at Risk of Being Disrupted by a Trusted Version of Itself*, Dog Ear Publishing, 2017, one of the required texts for this course. Professor Etwaru, who resides in Edgewater, New Jersey, will join the class in Syracuse on January 22nd, and thereafter every 2 weeks. Professor Etwaru participates remotely on alternate weeks. [https://ischool.syr.edu/people/directories/view/detwaru/](https://ischool.syr.edu/people/directories/view/detwaru/)

**Recommended Programming Hands-on, Self-Paced Learning**

- HTML and CSS for Beginners - [https://www.codecademy.com/ar/tracks/htmlcss](https://www.codecademy.com/ar/tracks/htmlcss)
- Intro to JavaScript - [https://www.udacity.com/course/intro-to-javascript--ud803](https://www.udacity.com/course/intro-to-javascript--ud803)
• Introduction to Node.js - [https://www.edx.org/course/introduction-node-js-microsoft-dev283x](https://www.edx.org/course/introduction-node-js-microsoft-dev283x)

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**Required Textbooks**

  (Refer to GitHub Repository of Author for accessing the code present in the book - [https://github.com/PacktPublishing/Building-Blockchain-Projects](https://github.com/PacktPublishing/Building-Blockchain-Projects))


  Recommended:


  Richie’s book is available through the bookstore; all 3 are available on Amazon; and will be available from SU bookstore and Bird Library soon.

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**Communications**

We will primarily communicate with you in class and via Blackboard. We will post announcements and additional recommended readings on Blackboard. Please send us email whenever you have a question or suggestion to improve the course and your learning experience. We will respond within 48 hours. Please call or text Professor McKnight if an issue requires immediate attention.

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**Activities and Assignments**

The course is organized around several learning activities, including readings, videos, and podcasts, labs, lectures, individual and group assignments.

**IST 400 Assignments/grade points**

<table>
<thead>
<tr>
<th>Participation</th>
<th>Labs 1-5 (Undergrad Students do 4 of 5 labs)</th>
<th>Midterm Exam</th>
<th>Mid-term Presentation/3-5pp concept paper</th>
<th>Final Project Term Paper</th>
<th>Final Presentation Demo + Poster</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>36 (9 points/lab)</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>
IST 600 Assignments/grades

<table>
<thead>
<tr>
<th>Participation</th>
<th>Labs 1-5 (7 points/lab)</th>
<th>Midterm Exam</th>
<th>Mid-term Presentation/3-5pp concept paper</th>
<th>Final Project Term Paper</th>
<th>Final Presentation Demo + Poster</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>35</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

1. **Class Participation:** (15pts) for IST 600; (14pts) for IST 400 students
   You do not get 15% - 14% credit just for showing up. But please plan to attend every class, as expected. A new tool may be used to assist the instructors and faculty assistants in monitoring your attendance; more information on that will be added to an update of this syllabus for your information.
   - In class participation and attendance: (15) (14)
     - Classes and online discussion may include blockchain management analysis or governance debate.
     - Your team will offer feedback on other student team presentations. This is NOT optional; non-participation by you and teammates will cost you points.

2. **Labs** (7 points each (grad); 9 points each (undergrad)
   Each completed lab report (including screen shots demonstrating your mastery and completion of the many steps required to complete each lab) is worth 7 points for grad students, and 9 points for undergrads. Full points awarded to students whose lab documentation is to professional standard of thoroughness, and demonstrates analytic creativity, as well as depth of analysis.

3. **Mid-Term Exam** (10 points)
   An in-class exam (individual) covers main topics discussed in readings & class.

4. **Mid-Term Sharktank Presentation & Concept paper** (10 points)
   Your group will prepare and present to your professors and industry executives, and afterward submit a 3-5 concept paper incorporating feedback. This either becomes the basis for your group’s final project, or indicates that based on this feedback your group will explore a new direction. Note: Your team will offer feedback on other student team presentations. This is NOT optional; non-participation by you and teammates will cost you points.

5. **Final Project Paper – Blockchain Management Research Paper with Executive Summary** (20pts) your 2-4-person team will conduct research, evaluate and deploy technology (likely Ethereum and/or Hyperledger, but the team may choose differently) exploring use of distributed ledger systems to address a real world problem over the semester. The co-instructors may offer suggestions and guidance towards interesting datasets, questions, and opportunities. Each team will submit a 10-15-page paper AND a 1-page Executive Summary. Both will
have 1.5 spacing, 12-point font, and 1 inch margins. Academic references following the APA format are expected. If you are unfamiliar with APA reference expectations, you are expected to learn, by consulting a librarian, or a fellow student, perhaps enrolled in the LIS program. Topics are to be discussed with and approved by the professors.

6. Final—Project Presentation/demo, Video and Poster (10pts)

Now, wow your classmates, professors, industry sharktank participants, and iSchool peers with your creativity and hard work over the course of the semester. Your team will offer feedback on other student team presentations. This is NOT optional; non-participation by you and teammates will cost you points.

NOTE ON OUR EXPECTATIONS FOR YOUR WORK

Let us be very clear that we have very high expectations for both the quality of your work and the quality of your participation. We will also make sure you are equipped with the ability to meet our expectations. Everyone can do well in this course if they put in the effort. This course should also be fun. This class relies heavily on intensive classroom interaction.

IST 400/600 Blockchain Management Class Schedule

<table>
<thead>
<tr>
<th>Class</th>
<th>Topic</th>
<th>Readings &amp; Assignments</th>
<th>Deadlines</th>
</tr>
</thead>
</table>
| 1.22  | Introduction to course. Final project/semester roadmap + intro to ledgers + contracts and inter-party trust. Decentralized Autonomous Organizations | **Blockchain Trust Companies**, Chapter 1: Cooperation and Control  
**Blockchain Applications**, Chapter 1, Blockchain Concepts(pdf)                                                                                                                                                                                                                                                                                         |           |
| 1.29  | Virtual currency/property + commons markets + emergent/virtual market models; | **Blockchain Trust Companies**, Chapters 2: Partnerships and Corporations; and  
3: Financial Control  
**Building Blockchain Projects**, Chapter 1: What is a DApp? and Chapter 2: Understanding How Ethereum Works  
Lab I Building a basic application with Ethereum  
https://www.udemy.com/blockchain-application/                                                                                                                                                                                                                                               | Lab I Assigned |
| 2.5 | encryption + distributed ledgers + hash + consensus | **Trust Companies** Chapter 4: The Flow of Wealth; **Projects**, Chapter 3 Writing Smart Contracts, Chapter 4, Getting Started with Web3.js  
**Lab II Leveraging Web3.js to build a Ethereum based application** | Lab 1 Due  
Lab II Assigned  
Guest Lecturer: Harpreet Geeke, Advisor, Government of Canada, Solidity Smart Contracts Lab II |
| 2.12 | proof of work + proof of stake + public/private ledgers | **Trust Companies** Chapter 5: The Trust Gap; **Building Blockchain Projects** Chapter 5: Building a Wallet Service  
Chapter 6: Building a Smart Contract Deployment Platform  
Refer to the course for reading about consensus algorithms and Hyperledger Platform  
[https://www.edx.org/course/blockchain-business-introduction-linuxfoundationx-lfs171x](https://www.edx.org/course/blockchain-business-introduction-linuxfoundationx-lfs171x) (Read Chapter -1 and Chapter -2)  
**Lab III Hyperledger**  
*Build your first chaincode*  
Lab III assigned |
| 2.19 | Ripple + Ethereum + Hyperledger (existing blockchain platforms) | **Trust Companies** Chapter 6 Big Data, Big Problems; **Building Blockchain Projects**, Chapter 7: Building a Betting App | Lab III due  
*Earn IBM Hyperledger badge! : )*  
Guest lecturer/lab presenter: Gerald Jamar Smith, IBM |
<p>| 2.26 | consensus + once we trust data, what | <strong>Mid-term exam</strong> | In-class exam + |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
</table>
| 3.3  | Autonomous programmable networks + smart contracts | **Trust Companies** Chapter 7: Spreadsheets Need to Be Disrupted  
**Chapter 8: The New Corporate Models Aren’t so New**  
**Building Blockchain Projects**,  
Chapter 8: Building Enterprise Level Smart Contracts  
Chapter 9: Building a Consortium Blockchain  
**Lab V Ethereum Private Network**  
Set up account: [https://azure.microsoft.com/en-us/free/](https://azure.microsoft.com/en-us/free/)  
Open the below mentioned link, right click on pdf file and click on save link as:  
“Ethereum Consortium Blockchain in Azure Marketplace”  
Then follow directions in pdf. (as far you can manage)  
**Lab IV Assigned;**  
**Blackboard Participation I (On IOT and Blockchain)** |
| 3.10 | Spring Break | Spring Break |
| 3.19 | Decentralized autonomous organizations I | **Trust Companies** Chapter 9: Enter the Blockchain Protocol;  
**1st Sharktank: Faculty and industry provide feedback on project concepts and architectures, business models**  
Sharktank Guest Judges (tent.): Kevin Quigley, IBM; Nomi Bergman, Advance Newhouse; John Quinn, VMware (invited) |
| 3.26 | Decentralized autonomous organizations II | **Trust Companies** Chapter 10: From Abundant Trust to Autonomy;  
**Lab V- Writing your own Solidity**  
**Lab V assigned**  
**Lab IV due** |
<table>
<thead>
<tr>
<th>Date</th>
<th>Task Description</th>
<th>Course Content</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2</td>
<td>Final Project Teams &amp; Concepts Review</td>
<td><em>Trust Companies</em> Chapter 11: From Consensus to Autonomy; <em>Applications</em>, Chapter 10, Advanced Topics</td>
<td>Lab V due; Final Project Paper Concept Due for review and feedback (not graded but required)</td>
</tr>
<tr>
<td>4.9</td>
<td>Blockchain Management Project research</td>
<td><em>Trust Companies</em> Chapter 12: The Future: Trust Companies</td>
<td>Blackboard Participation II Assigned (on DAO Attack)</td>
</tr>
<tr>
<td>4.16</td>
<td>Blockchain Management Project Implementation</td>
<td>Students refine final plans and work schedule to prepare <em>blockchain ‘demo or die’ presentation</em>; and complete <em>Research Paper, Video &amp; Poster</em></td>
<td></td>
</tr>
<tr>
<td>4.23</td>
<td>Final Presentations &amp; Demos Part I</td>
<td>Industry Sharktank and faculty offer feedback and recommendations for points to clarify for final paper; and on business viability of student work.</td>
<td>Guest Sharktank Judges TBD Presentations, Demos &amp; Posters Due</td>
</tr>
<tr>
<td>4.29</td>
<td>Optional &amp; Ungraded Experiential Learning Road trip to Fordham University, New York City</td>
<td>Members of 4.23 student teams <em>may, but are not required, to present at Fordham Blockchain Conference, Sunday, April 29th.</em> Approximately 250 attendees expected – an opportunity to practice your public speaking skills!</td>
<td>(Optional) @ Fordham Blockchain Conference Presentations, Demos, Posters of 4.23 projects</td>
</tr>
<tr>
<td>4.30</td>
<td>Final Presentations &amp; Demos Part II</td>
<td>Industry Sharktank and faculty offer feedback and recommendations for points to clarify for final paper; and on business viability of student work.</td>
<td>Guest Sharktank Judges TBD Presentations, Demos &amp; Posters Due</td>
</tr>
<tr>
<td>5.7</td>
<td>Final Paper</td>
<td>Incorporating feedback and suggestions from your poster and Sharktank presentations, your final paper will be of course – brilliant!</td>
<td>Final Paper Due</td>
</tr>
</tbody>
</table>
Required & Recommended Assigned Readings

Books


Recommended Book

Journal Articles

Benshoof, B., Harrison, R. W., & Place, P. (2016). Distributed Decentralized Domain Name Service. [https://doi.org/10.1109/IPDPSW.2016.109](https://doi.org/10.1109/IPDPSW.2016.109)


McKnight, L, and William Lehr, Show Me the Money. Contracts and Agents in Service Level
McKnight, L., Etwaru, R., and Yu, Y., Commodifying Trust: Trusted Commerce Policy Intersecting Blockchain and Internet of Things, 45th TPRC Research Conference on Communications, Information and Internet Policy, George Mason University School of Law, Arlington, Virginia, September 8-9, 2017


Technical and industry reports, trade articles & blog/web posts


Ernst & Young, Blockchain Technology as a Platform for Digitization. Implications for the Insurance Industry, 2016.

file://hd.ad.syr.edu/01/0a16e5/Documents/Downloads/IBM%20Blockchain.pdf

Ralph C. Merkle, DAOs, Democracy and Governance, Version 1.9, May 31 2016

‘Bitcoin distracts from the real value of blockchain: For technology executives, the new challenge is to chain or be chained’

Joanna Belbey, How to Invest in the Institutional Revolution of Blockchain, Forbes Magazine, January 18, 2017


https://media.consensys.net/5-blockchain-iot-applications-6202c8e7c4c0#.g0t63fizs

Blockchain & Related Resources and Labs

The Homestead Documentation Initiative
http://www.ethdocs.org/en/latest/about.html

https://www.ethereum.org/dao

http://rogerdudler.github.io/git-guide/


https://www.hyperledger.org/

https://github.com/hyperledger/fabric

https://developer.ibm.com/courses/all-courses/blockchain-for-developers/


https://ripple.com/build/how-to-multi-sign/


Videos
The Blockchain Effect on Healthcare: How #Blockchain Will Transform Healthcare in 25 Years
https://www.youtube.com/watch?v=GO9Q7i-IcA8
HealthIT TV - Debating the utility of Blockchain in Healthcare
https://www.youtube.com/watch?v=LEgljmCA9I0

#DisrupTV: Defensive Incumbent Innovation at IMS Health
https://vimeo.com/165635152

CNSSummit - Blockchain 101: The Institutional Revolution & Healthcare (Richie Etwaru)
https://www.youtube.com/watch?t=738s&v=EvUNGRMnqGA&app=desktop

Executive Exchange - Moving Beyond the Hype of Blockchain
https://vimeo.com/192524153

Other Resources


Related Course Syllabi
MIT: MAS.S65 - Blockchain Technologies: Decentralize all the Things
http://blockchain.media.mit.edu/syllabus.html

Stanford: CS.251 – Bitcoin and Cryptocurrencies
https://crypto.stanford.edu/cs251/syllabus.html

Coursera: Bitcoin and Cryptocurrency Technologies – Princeton University
Course Policies

Learning Management System (LMS)

Blackboard is the School of Information Studies’ learning management system for on-campus and online courses. Each course has its own space in Blackboard where instructors create and post content that enables students to communicate with one another and engage in course materials. It is encouraged to incorporate Blackboard into your course(s) and we have extensive staff expertise to help you find the right blend between traditional and online instruction. Blackboard and many other instructional tools are supported by the iSchool for assistance with on-campus and/or online course development within Blackboard, visit Peggy Brown in 114, email pbrown01@syr.edu or call 9370. In addition to Blackboard, other tools, services and platforms may be offered to students for particular exercises or learning modules.

Attendance Policy

Students are required to attend the class in person and may not miss more than two classes. If more than two classes are missed, you will lose a full letter grade. If you cannot attend a class, you have to give notice to your instructor at least 48 hours in advance. Unexcused absences will result in loss of participation points for that day.

General Course Policies

Work must be the student's own, unless collaboration is specifically and explicitly permitted. Any unauthorized collaboration or copying will at minimum result in no credit for the affected assignment and may be subject to further action under the School of Information Studies Statement on Academic Integrity, available in IST student handbook in your orientation materials or see below, and you should acquaint yourself with them. Also, you can get the information at the IST student Service Office in Hinds Hall 114. Late assignments will not be accepted, unless specific arrangements have been made with the instructor prior to the deadline. We will make every effort to return assignments within one week after they are due. With the exception of in-class exercises and exams, assignments must be typewritten. This published syllabus is subject to change. Please make the appropriate adjustments announced in class. Please feel free to ask questions by email, telephone or in-class. We read our electronic mail almost throughout the day every day and will try to respond as soon as possible. If the nature of your question requires an interactive session, please make an appointment or use office hours.

The tentative course schedule is on this syllabus. While the schedule may change, depending on our progress in the course, you are expected to use this as a guide to your reading and studying. We expect you to have read the materials before the lecture on the subject as listed here. We will inform of schedule updates as needed. The class web site is located at the URL for users to log in is http://ischool.syr.edu/learn. The email address for assistance is Blackboard-iSchool if you have any questions about Blackboard Learn functions that are not easily resolved by referring to the documents available on the web site, please contact Peggy Brown at 315-443-9370. Ask
questions. It is important for the student to be an active participant in the educational process

**iSchool Statement on Academic Integrity**

Syracuse University sets high standards for academic integrity. Those standards are supported and enforced by students, including those who serve as academic integrity hearing panel members and hearing officers. The presumptive sanction for a first offense is course failure, accompanied by the transcript notation “Violation of the Academic Integrity Policy.” The standard sanction for a first offense by graduate students is suspension or expulsion. Students should review the Office of Academic Integrity online resource “University Academic and honor theses, graduate theses, graduate research projects, dissertations, or other exit projects submitted in partial fulfillment of degree requirements are placed in the library, University Archives, or academic departments for public reference.
Innovation Policy

Students at Syracuse University retain 100 percent ownership of student created intellectual property inside or outside of the classroom unless the innovation is created as an employee of Syracuse University or with significant use of Syracuse University laboratories. The faculty may encourage open innovation and information sharing for research and education. Students may be advised to seek additional feedback and guidance from the Blackstone LaunchPad, the Syracuse Technology Commercialization Law Program, and/or to submit an ‘Ideas and Inventions’ Disclosure Form to Syracuse University’s Office of Technology. The university may then better advise and assist you. If a student is working on a federally funded research project, they must disclose to the instructors and their faculty research supervisor. This is so that we may better assist and advise students on their Blockchain Management course presentation and project plans.

FERPA

The Family Educational Rights and Privacy Act of 1974 (FERPA) and SU’s FERPA institutional management (http://supolicies.syr.edu/studs/ferpa.htm) set forth requirements regarding the privacy of student records. Federal regulations and University policies are fairly complex, but in general, you should err on the side of caution whenever dealing with issues of student privacy. Specific questions may be directed to the iSchool Student Services office or to the Registrar’s Office (443-3535). There are a number of rights for students of which instructors must be aware.

Faith-Based Observances

Syracuse University recognizes the diverse faith traditions represented among its campus community and supports the rights of faculty, staff, and students to observe according to these. View a detailed student policy. Under this policy, students are provided an opportunity to make up examination, study, or work requirements that may be missed due to religious observance provided they notify the university and their instructors before the end of the second week of classes. Students will have access to an online notification system for this purpose on MySlice during the first two weeks of the semester. Instructors will also have MySlice access to a list of students who have provided notification. We ask that you be as flexible as possible in accommodating these students. View more information within the iSchool Faculty Center and a list of the religious traditions on the Syracuse University Chapel schedule.

Turnitin

This class will be using Turnitin, a plagiarism prevention system. The ease of using the Internet has made it very easy for students to “cut and paste” material into papers that they are writing without proper citation. I will submit all/some/ papers that you write in this class to Turnitin, a service that identifies “matched text.” I will then interpret the originality report, based on your writing capability and writing style. In this class, you will also be given the opportunity to submit your own papers to Turnitin to check that all sources you have used are properly acknowledged and cited. Note that all submitted papers will be included as source documents in the Turnitin.com reference database, solely for the purpose of detecting plagiarism of such papers.

IT Services

IT Services works closely with SU’s central Information Technology and Services group to provide IT support services to students, faculty and staff. Students have access to a range of specialized
software and hardware in our labs and also to a large library of applications through our participation in the Microsoft Academic Alliance and the VMware e-academy. In addition, faculty and staff may also have access to certain specialized applications. For more information about software availability, visit ITS-Syracuse University. Faculty can find answers to other common questions at our Top Ten Faculty questions page:

Syllabus updated January 22, 2018