NJIT
New Jersey Institute
of Technology

MARTIN TUCHMAN SCHOOL OF MANAGEMENT

Course Syllabus [This version: Jan. 16th, 2024]

FIN 306: Blockchain Technology for Business

Term: **Spring 2024**

Instructor: Dr. Jim (Junmin) **Shi**
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                 Note: e-mail is the best form of contact;
                 Please add *FIN306* as a part of the subject line
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Class Venue:

Section Number	Classroom	Meeting Time	Weekday
002	**FMH 308**	02:30 - 03:50 PM	Tuesday/Thursday

Office Hour: WeBex office by appointment (it is better to send an email before dropping by).
          Preferable **4-5pm Tuesday**.

Course Homepage: Canvas, select FIN 306 for course materials
Log in link: https://canvas.njit.edu/
          The University uses the online learning platform "Canvas" for teaching staff to
          communicate with students, disseminate information and conduct out-of-class
          activities.

Office: WeBex Virtual Office (https://njit.webex.com/join/jshi)

TA: [TBD]   XXXX@njit.edu
The TAs will be grading written assignments and projects.
The TAs will also hold TA office hours upon request.

Remote Learning: In response to unexpected risk or events, occasionally, this course might be

          delivered online through webex as the online teaching platform.

Online teaching: Asynchronized & Synchronized sessions

The lectures will be primarily delivered online via synchronized sessions.
Sometimes, if needed (e.g., Lab sessions), we shall leverage the hybrid of asynchronized and synchronized sessions.

Synergy with IBM Curriculum (Cognitive Class):

At the end of the course, students are encouraged to register and take IBM online Cognitive Class of

Blockchain Essentials developer[1].

Students have the opportunity to obtain IBM issued digital badge contingent on their pass of the required exam.

Prerequisites:

- o   MGMT 216: Business Statistics Analytics;
- o   FIN 218:   Financial Markets and Institutions;

Course description

This course aims to deliver fundamental concepts, principle, business applications and technical skills pertaining to blockchain. In particular, students will delve into the world of blockchain technology and the promise it holds for business. In addition, students will study how cryptocurrencies like Bitcoin make use of the blockchain to facilitate peer-to-peer digital transactions. With a solid understanding of the mechanics of the cryptocurrency blockchain protocol, students will discover the problems blockchain technologies aim to solve and determine how they can support the business goals. Student will do this by learning about smart contracts and the most important use cases. Students will analyze how smart contracts work, how they're used today, and how to reason about their capabilities, and what ongoing technical challenges they pose. In the course project, students will come up with their own application and outline the challenges that might exist in its adoption.

For the practical skill of Blockchain leverage, the blockchain techniques and system development will be illustrated by IBM Skills Academy Platform through Blockchain Design and Lab sessions.

Course Scope and Mission

Blockchain, as a disruptive technology, has recently become synonymous with cryptocurrency, but its applications go far beyond financial transactions. In fact, any industry that makes use of an intermediary to verify transactions could make use of blockchain technology. Companies in every industry are beginning to understand and explore how to apply blockchain-based solutions to solve business problems. Following this trajectory, industry has been creating an extraordinary demand for skilled workforce who have the knowledge of blockchain technology for business applications.

In this course, students will delve into the world of blockchain technology and the promise it holds for business. In particular, students will study how cryptocurrencies like Bitcoin make use of the blockchain to facilitate peer-to-peer digital transactions. With a solid understanding of the mechanics of the cryptocurrency blockchain protocol, students will discover the problems blockchain technologies aim to solve and determine how they can support the business goals. Student will do this by learning about smart contracts and the most important use cases. Students will analyze how smart contracts work, how they're used today, and how to reason about their capabilities, and what ongoing technical challenges they pose. In the course project, students will come up with their own application and

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[1] https://cognitiveclass.ai/

outline the challenges that might exist in its adoption. For the practical skill of Blockchain leverage, the blockchain techniques and system development will be illustrated by IBM Skills Academy Platform through Blockchain Design and Lab sessions.

Making the CASE with STEM

This course is designated with CASE based on STEM. In particular, it aims to deliver the skill in terms of

- o **C**reativity: Creativity is at the heart of the future business.

- o **A**nalytics: Analytics skill based on data is a core.

- o **S**torytelling: Being able to tell a story is perhaps one of the most important skills a business analyst must do. This will be trained with a number of real business projects.

- o **E**xperience: And now more than ever, a business needs to provide an engaging customer experience, so the experience is paramount. This will be trained with a sequence of hands-on business problems.
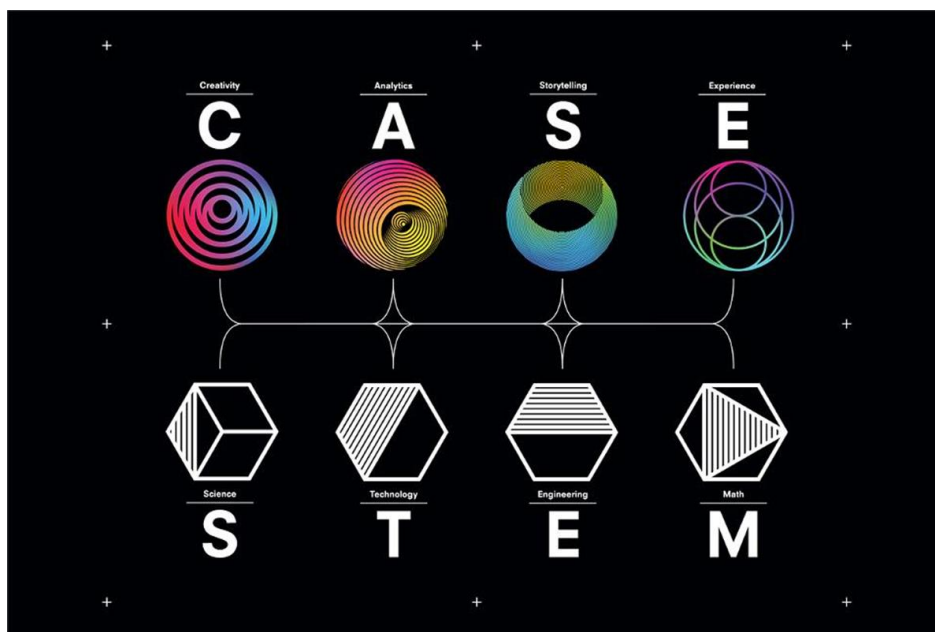
General Course Objectives:

Through this course, students learn about some of the common challenges facing business networks and the essentials of Blockchain technology for business applications. In particular, students can learn how to leverage the disruptive technology of Blockchain and Smart Contracts to record and process business transactions.

Upon completion of this course, students will obtain the following mastery of blockchain technology:

- o Understand the evolution of Blockchain
- o Learn from industry's experience on Blockchain use cases
- o Blockchain and distributed ledger systems in a business environment
- o The disruptive features of Blokchain technology
- o Important concepts and key use cases of blockchain for business
- o How assets can be transferred in a blockchain network
- o The role and application of Hyperledger Fabric for Blockchain projects
- o Developing basic Blockchain plateforms with IBM's Hyperledger Fabric
- o Student will get ready to proceed to the next level of the blockchain journey

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Some features of the course:

1) Rich of examples associated with real-business problems;
2) Practical applications with a sequence of hands-on projects;
3) Hands-on practice with Spreadsheet, IBM Hyperledger as the fundamental tools;
4) Heavy engagement is necessary.

Reference Textbooks (Optional)

Although there is no textbook required, the following texts might be a good reference.

- **Mastering Blockchain:** A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Imran Bashir (2021), Packt.

- **Blockchain Basics:** A Non-Technical Introduction in 25 Steps, Daniel Drescher (2017), ISBN-13: 978-1484226032, ISBN-10: 1484226038, Apress.

- **Recommended Reference:** Numerous white papers, reports and articles will be handed out through the lectures.

Course Materials

- **All course materials** (made available on Canvas before/after the relevant sessions)
    - Slides and supplemental articles
    - Case solutions
    - Practice problem sets
    - Sample questions

- **Supplementary Material**: The course textbook will be supplemented with other materials including research paper readings, business news and reports, handouts, oral presentations, industry articles, case studies, etc.

Software Tools (Required):

Microsoft Excel	Available as part of Microsoft Office Suite 2016 or newer version (Microsoft OS); Office: Mac 2016 for newer version (Mac OS); Please be aware of the differences among versions in features and layout. We shall only use Excel 2016 for Windows OS. If needed, I will try my best to address your questions that you might have with Mac Excel.
Hyperledger Fabric	IBM's blockchain services

Attendance/Class Participation/Homework:
Your class participation is very imperative, and the participation grade will be mainly based on attendance, class discussion, Q/A response, etc. All homework assignments will be reviewed in class, but homework will not be collected. You are expected to attend classes. Class attendance will be taken in the beginning of class. If you do miss a class, you are responsible for obtaining notes and remaining current. It is not possible to repeat lectures for students missing class. One "free" absence is allowed. There are no "excused absences."

It is clear that the final grade will be an "F" if you missed FIVE or more attendances.

Late students are responsible for signing the class roll at each class meeting before leaving. Otherwise, you will be considered absent. Excessively late students and students leaving early will be penalized. If you arrive late, it is **your** responsibility to remember to sign the roll before you leave.

> **All pagers, cell phones should be turned off or muted during class.**
>
> **All pagers, cell phones and smart devices (e.g., Apple Watch) should be turned off during tests.**
>
> **Lab computer is for lecture purpose only; checking emails or other internet actions are firmly prohibited. This will be counted as a part of class attendance.**

Evaluation and Grades

Grades are a measure of the performance of a student in individual courses. Each student shall be judged on the basis of how well he or she has command of the course materials. The overall assessment for the final grade is based on the following components in terms of the total weighted average:

Grading:		Points
Assignments	Multiple Assignments (online submission)	30
Mid-Term Project	Project and Mid-term paper	20
Final Project	Final Term paper and Presentation	30
Attendance	Class participation (guest speech and seminars)	20
Sum		**100**

*Note: The attendance and engagement is also counted by other commitments in addition to the regular class participation, such as seminar attendance (e.g., Leir Research Institute (LRI) or Real Estate Institute), Guest Speeches, Presentation on Selected Blockchain Topic, final presentation on the Term Paper on Blockchain Development.

Please note that NJIT recommended grading scheme is as follows:

A	for Superior performance (90% or higher)
B+	for excellent performance (87 to 89.99%)
B	for very good performance (82 to 86.99%)
C+	for acceptable performance (76 to 81.99%)
C	for fair performance (70 to 75.99%)
D	for minimal performance (65 to 69.99%)
F	Otherwise.

Professional and personal circumstances that preclude you from performing at satisfactory levels will not be considered in the determination of the course grade. The effect of your grade on overall GPA, eligibility for graduation, loss of scholarship, loss of a United States resident card, placement on academic probation, etc., are *not* considered in the determination of your grade. There are no

<u>extra credit assignments. Individual requests for alternative ways to improve your course grade will not be considered.</u>

<u>There will be no makeup exam, nor extra work for extra credit</u>. So please make all your effort to attend the scheduled tests. Your final grade is not subject to negotiation. After all the lectures, **<u>please do not ask me for extra work for extra credit</u>**.

Examinations:

Tests will be administered in class according to the attached schedule. Tests may be a mixture of multiple choice and true/false. Class tests and the common final will test both your understanding of concepts and problem solving ability, and will also include questions about the use of Excel to solve problems (e.g., related Excel formulas) in this course.

For in-class tests, you will need to bring a basic calculator (with a square root button!) and *one* 8.5"x11" page of notes (two-sided, must be *hand written* by yourself). Smart phone or smart devices (e.g., Apple Watch) are firmly restricted to the test. Students are required to provide their own pencils and scratch paper. All material needed for tests will be covered in class. All students are required to take the tests.

Individual Student Projects:

Individual class projects will be discussed in class. These are **not** group projects! Projects are to be submitted on paper by each student by the designated date, including data output and formulas. No diskettes will be accepted, as they are easily misplaced and damaged. *Late projects will be penalized at a rate of 5% per calendar day.* In addition, once the deadline has passed, no further feedback will be given. Use the "fit to one page" option to print your output on 8.5x11" sheets. No report covers, please! Students submitting spreadsheets that are not unique will receive **a zero grade** for the project!   You may discuss projects with your classmates, but the work you turn in **must be your own**!

PowerPoint Slides:

Copies of the PowerPoint slides for this course can be found on the class website (see page one of this syllabus). To minimize note taking, you should print the slides for each class in advance and bring them to class.

E-mail communication

Students are to use their NJIT e-mail (ucid@njit.edu) in communicating with the instructor.
It is also convenient to communicate at Canvas platform.

Computer Requirement and Access to the Internet

NJIT requires all students to have access to a computer at their place of residence. Details as to this requirement may be found on the college's website on the page describing NJIT's [Undergraduate Student Computer Requirement](#).

Access to the Internet is required for this course. NJIT provides on campus access to the Internet to all students. Details as how to access the Internet as well as other resources at NJIT may be found in the [Student Quick Start Guide](#).

Deadlines/Late Work/Make-ups

Specific policies concerning the acceptance of late work and make-ups are discussed in the sections covering course requirements. In general, work will not be accepted late and make-ups will not be given. Exceptions will be made when extraordinary circumstances were responsible for work not being completed on time. Students may need to contact the Dean of Students' office and have it determined that the reasons given for not doing the work on time are valid.

Incompletes

Incompletes will be given only to students who cannot finish the course on time due to major reasons outside of their control (e.g., illness, family tragedy, military service). Students may need to contact the Dean of Students' office and have it determined that the reasons given for not doing the work on time are valid.

Students with disabilities

Students with disabilities needing accommodations of any nature so as to have a fair opportunity to perform in the class need to contact the counseling center. Staff at the counseling center will determine what constitutes a reasonable accommodation and inform the instructor of what it is.

Honor Code & Academic Integrity:

Plagiarism in any form is not acceptable. Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.

If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

Artificial Intelligence & Chat GPT:

While the field of artificial intelligence is moving fast and affecting many aspects of our jobs, we shall comply with the following guidelines:

o   Use of AI such as ChatGPT is not permitted in any stages of the writing process on any assignment.
o   Use of AI such as ChatGPT is only permitted to help you brainstorm ideas and see examples. All material you submit must be your own.
o   Use of AI such as ChatGPT is fully permitted, but you must cite the tool and be able to explain any work that you submit.

Course Schedule: Overview

Table 1: Competencies and Skills Covered by the Course

Methodology	Laboratories	Use cases
01. Blockchain Landscape	01. Command Line Interface	01. Build an Insurance App
02. Blockchain Ecosystem	02. Scripting	02. VisibilitytoEnhanceTrust
03. Public vs Private Ledgers	03. JavaScript	03. Consensus and Security
04. Permissioned Ledgers	04. NodeJS	04. IoT Asset Tracking App
05. Hyperledger Technologies	05. Hyperledger Foundations	05. Privacy &Security
06. The Hash Chain	06. Hyperledger Tools	06. Encryption
07. Consensus Algorithms	07. Hyperledger Fabric CLI	07. Transparency
08. Network Nodes	08. Hyperledger Fabric SDK	08. Car Auction App
09. Blockchain UseCases	09. Hyperledger Front-end	09. Public Key Infrastructure
10. Smart Contracts	10. Hyperledger Composer	10. Blockchain Case Studies
11. Chain-code Design	11. PlaygroundUser Interface	
12. Blockchain Platforms	12. Blockchain Starter Plan	
13. Blockchain Futures	13. Jupyter Notebooks	

Tentative Course Topics and Schedule
Deviations may be necessary as needed
Some supplementary homework assignments will be added as the course progresses.

1. Course Topics

Module 1 - What is Blockchain? (2 Weeks)

- Business networks
- Assets and Digital Assets
- Ledgers, Transactions and Contracts
- The issues with existing networks
- How blockchain solves this problem
- Smart contracts
- Different types of blockchain
- Requirements of a blockchain for business

Module 2 – Use Cases and Examples of Blockchain Networks (3 Weeks)

- Overview of active networks
- **Case Study**: TradeLens - Improving global trade
- **Case Study**: IBM Food Trust - Supply chain transparency
- **Case Study**: IBM World Wire - Global payments
- Decentralised and trusted identity
- Further examples by industry
- Key players for blockchain adoption

Module 3 – Monetoray Evolution and Cryptocurrency (3 Week Lecture)

- Cryptocurrencies and the Evolution of Monetary Systems
- Using Tokens to Design New Types of Digital Platforms
- Mining Methods
- Enter Bitcoin: The Experiment That Allows Experimentation
- The Rise of Cryptocurrencies

Module 4 - IBM and Blockchain (3 Week Lecture)

- How IBM can help with a blockchain project
- IBM's blockchain strategy
- The IBM Blockchain Platform
- The Linux Foundation's Hyperledger project
- Hyperledger Fabric
- Continuing your blockchain journey

Module 5 – Hypeledger Fabric and Blockchain Development (2 Week)

- Demo - Vehicle Lifecycle Demo
- System Development for Transfer Assets in Blockchain
- **Lab Session**: Building an Insurance Application