

Financial Information Systems INFO-GB.3350 INFO-UB.6050 Fall 2023 - Preliminary Subject to Change	
Instructor	Bernard S. Donefer http://pages.stern.nyu.edu/~bdonefer/
Class Meetings	Thursday 6:00 – 9:00 pm Room TBA (In person only, not on Zoom)
Email	bdonefer@stern.nyu.edu
Course Website	NYU LMS Brightspace
Office Hours	Appointments before class <i>scheduled via email only</i> 4:30-5:30 in KMC 8-171 or after class without appointment

Understanding finance doesn't prepare you for the realities of how markets and their underlying infrastructure work today. Technology is a key driver of advances in the global markets. Virtually all US trading is done on electronic markets with exchange floors a relic of the past. Trading is done using algorithms, high frequency quant models and by automated market makers. We have now have ~~44~~ 24 competing stock exchanges and over 40 Alternative Trading Systems (ATSs) providing *the mysterious dark liquidity which executes more than a third of our stock trades*. We hear the markets rigged? We examine the issues of market structure and technology interaction that underlie these claims and make our own objective assessment. We study evolving payment systems, such as online transaction security using encryption, hashing, digital signatures, EMV, global mobile payment products, Bitcoin and crypto currencies including CBDCs and Decentralized Finance (DeFi). In examining post trade clearing and settlement, we consider how the blockchain may significantly improve these processes.

The financial services industry is being transformed by globalization, regulation, competition, consolidation and technology. These forces will be explored, focusing on how technology is both a driver of change as well as the vehicle for its implementation. Industry consolidation and convergence will be viewed in light of current events. The course objective is to bring both the business practitioner and technologist closer together. Topics will be covered through a combination of lectures, readings, news and case studies.

COURSE DESCRIPTION

The course consists of five primary topics, describing their underlying technology and industry practices:

1. Payment systems, institutional (Fedwire, CHIPS, ACH, SWIFT) and retail credit/debit cards and mobile payments (Zelle, Paypal, Alipay, etc.)
2. Internet transaction security, cryptography, digital signatures, TLS security layer
3. Blockchain, Cryptocurrency, Bitcoin, Ethereum smart contracts, new decentralized finance (DeFi) applications
4. Securities markets, electronic trading, high frequency trading, post trade clearance and settlement

PREREQUISITES

None, however one course in investments, equities, fixed income, etc. or equivalent personal experience would be beneficial. If you have any questions, please contact me with any questions.

TEACHING MATERIALS

- o NYU LMS website for this course will contain lecture materials and late breaking news
- o Readings will be posted on NYU LMS at least a week early and should be read prior to each class. **THERE IS NO TEXT BOOK** for this course as most books are not current.
- o Students are encouraged to find current materials in the news or on the Internet for class discussion.
- o Industry speakers will be invited periodically. Their materials will also be posted.

GRADING (Tentative)

Item	Grade
First Quiz – Intro and payment systems	30%
Second Quiz – Internet security, blockchain, crypto	30%
Third Quiz – Financial markets	30%
Assignments and class participation	10%

Quiz study guides will be posted and quiz dates will be announced in class.

YOUR E-MAIL ADDRESS

Be sure your email address in NYU Brightspace is correct. I will use it to communicate timely information about the course.

CLASSROOM BEHAVIOUR

Please follow covid protocols in force when the semester begins

Stern rules state that **you may not use cell phones, laptops, pads or other ELECTRONIC DEVICES OF ANY KIND during class meetings. You must silence cell phones BEFORE class.** If you are on-call for work or family, place your device on vibrate and leave the room before taking the call. If your phone rings, you will be asked to leave. Further I reserve the right to reduce your final grade by reducing points normally awarded for class participation.

Class will start on time. Arriving late interferes with other students' learning and is not acceptable. Subway delays and other problems are unavoidable on occasion, but it is each student's responsibility to plan carefully to arrive on time and well prepared. Repeated latecomers will be penalized. **Classes are recorded and will be available for students unable to attend a session.** Repeated absences will affect class participation grades.

As a mark of respect, **I ask all men to remove their caps or hats while in class**, unless worn for a religious reason.

Eating in class is limited to foods/drinks that can be eaten quietly and not so fragrant as to disturb other students in the class. There will be a short dinner break at about 7:30.

Default Policies for Stern Courses are incorporated by reference:

<https://www.stern.nyu.edu/portal-partners/current-students/undergraduate/community/community-expectations>

<https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/code-of-ethical-conduct.html#maintenance>

<http://www.stern.nyu.edu/portal-partners/academic-affairs-advising/policies-procedures/default-policies-stern-courses>

<http://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/academic-integrity-for-students-at-nyu.html>

Student Accessibility

If you will require academic accommodation of any kind during this course, you must notify me at the beginning of the course (or as soon as your need arises) and provide a letter from the Moses Center for Student Accessibility (212-998-4980, mosescsa@nyu.edu) verifying your registration and outlining the accommodations they recommend. For more information, visit the CSA website: <https://www.nyu.edu/students/communities-and-groups/student-accessibility.html>

Student Wellness

Classes can get stressful. I encourage you to reach out if you need help. The NYU Wellness Exchange offers mental health support. You can reach them 24/7 at 212 443 9999, or via the “NYU Wellness Exchange” app. There are also drop in hours and appointments. Find out more at: <http://www.nyu.edu/students/health-and-wellness/counseling-services.html>

Name Pronunciation and Pronouns

NYU Stern students now have the ability to include their pronouns and name pronunciation in Albert. I encourage you to share your name pronunciation and pronouns this way. Please utilize this link for additional information: [Pronouns & Name Pronunciation](#)

Religious Observances and Other Absences

NYU’s Calendar Policy on Religious Holidays states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. You must notify me in advance of religious holidays or observances that might coincide with exams, assignments, or class times to schedule mutually acceptable alternatives. Students may also contact religiousaccommodations@nyu.edu for assistance.

NYU Stern is committed to ensuring an equitable educational experience for all students regardless of identity or circumstances and strives to recognize the obligations its students have outside of Stern. Please review all class dates at the start of the semester and review all course requirements to identify any foreseeable conflicts with exams, course assignments, projects, or other items required for participation and attendance. If you are aware of a potential conflict, please contact me as soon as possible to discuss any potential conflicts to determine whether/how they can be accommodated.

*If full attendance is required:

Except for religious observances or other absences that may be required in compliance with nondiscrimination law, this class otherwise requires attendance and participation and cannot accommodate conflicts. Please review all class dates at the start of the semester and review all course requirements to identify any foreseeable conflicts with exams, course assignments, projects, or other items required for participation and attendance. If you are aware of a potential conflict, it is strongly recommended that you do not take this class.

Inclusion Statement

This course strives to support and cultivate diversity of thought, perspectives, and experiences. The intent is to present materials and activities that will challenge your current perspectives with a goal of understanding how others might see situations differently. By participating in this course, it is the expectation that everyone commits to making this an inclusive learning environment for all.

Integrity

This course has a “zero tolerance” policy on cheating and plagiarism. Any student who breaks academic rules in this course has violated the mutual trust on which teaching and learning are based and will not only receive a zero for that assignment, but will be excluded from taking any further quizzes or exams in this course, which is likely to result in a failing grade for the course. For serious infractions I will ask the University’s Disciplinary Panel to suspend the violator from all future courses. Remember that giving improper help is as clearly a violation as taking it. Please see the NYU Stern Code of Conduct.

Topic Schedule

Classes Thursdays September 21 - December 14, 2023 (Ex Nov 23)

All topics, dates and guest speakers are subject to change.

Topics do not equate to class meetings.

Changes will be posted on NYU Brightspace

Date	Topics	Questions
Topic 1	Course Logistics Introduction Financial Services - Banks	What's this course about? How are the teaching materials organized? What is the grading policy? How should we communicate? How is the financial services industry organized? Money, and banking history and functions Federal Reserve Bank
Topic 2	Payment Systems I Retail	What is the history and economics of various payment methods? Cash, checking, debit cards, credit, prepaid cards How are payments processed in the US? Smart chip cards, NFC communication What has the experience been with emerging payment systems, Paypal, EMV, Square, EZpass, Metrocards, Zelle, Venmo, Alipay, mPesa, etc. PCI DSS Standards
Topic 3	Payment Systems II Institutional	Institutional high value payments via ACH, Fedwire, CHIPS and SWIFT. CLS for ForEx Clearance and Settlement Bangladesh Central Bank Hack -- Fedwire ISO 20022 standards
Topic 4	Internet Transaction Security – Encryption, hashing, digital signatures	Secret key and public key, symmetric and asymmetric encryption, RSA ECC How to secure internet payments. SSL/TLS Encryption Use of public key infrastructure Hashing – securing passwords on a server Digital signatures
Topic 5	Blockchain and Bitcoin	Distributed ledgers, peer to peer computing, hash pointers How the Blockchain works, transactions, wallets Cryptocurrency - Bitcoin Mining consensus Proof of Work Building an exchange on a blockchain
Topic 6	Smart Contracts and Blockchain Use Cases Cryptocurrencies	Smart contracts Ethereum EMV Proof of Stake Initial coin offerings (ICOs) and other cryptocurrencies Decentralized Finance (DeFi) Exchanges, staking, NFTs Proof of concept blockchain use cases Central Bank Digital Currency
Topic 7	Introduction to Financial Services - Securities	What are the functions of securities, insurance, markets? Differences between retail and institutional, buy side and sell side How firms raise capital, The IPO process and Google's Dutch auction How to research a firm and Homework Assignment
Topic 8	Introduction to Markets	Markets and Price Discovery Market Data and the SIP Market Indices Order and Execution Management Systems (OMS/EMS)

Topic 9A	US Equity Markets NYSE	<p>What was the history of the NYSE</p> <p>How is the floor organized in posts and booths?</p> <p>What is a seat</p> <p>Who are the people on the floor, brokers, (house and \$2) and the specialists?</p> <p>What is the trading process?</p> <p>How did abuses and regulation drive it</p> <p>Reg 390, Reg ATS and decimalization, implications of Reg NMS</p> <p>What happened in 2005 – the new NYSE Group</p> <p>Merger with Arca Exchange</p> <p>DMMs, SLPs – the new trading process</p> <p>Future of the NYSE</p>
Topic 9B	US Equity Markets NASDAQ	<p>What is the history of NASDAQ</p> <p>How does its multi-dealer model work; What is its trading process and rules</p> <p>How does an order book work?</p> <p>What was the impact of ECNs</p> <p>Maker taker model</p> <p>Acquisitions of INET and BRUT by NASDAQ</p> <p>What happened when NASDAQ became an “exchange”</p> <p>the Trade Reporting Facility (TRF)</p> <p>What are NASDAQ’s future plans?</p> <p>OTC Markets Microcap and Pinksheets</p>
Topic 10	Institutional Trading	<p>The institutional search for liquidity</p> <p>Transaction Cost Accounting (TCA)</p> <p>Benchmarks, VWAP, implementation shortfall etc. and post trade analytics</p> <p>Algorithmic trading by institutions</p> <p>Alternative Trading Systems e.g., Liquidnet, BIDS, LEVEL, etc.</p> <p>Dark liquidity, dark pools</p> <p>Market Structure 24 Exchanges and 40+Dark Pools</p> <p>Electronic Fixed Income and FX markets</p>
Topic 11	Low latency Trading and the Flash Crash HFT and Are US Equity Markets Rigged?	<p>Automated Market Making, Payment for Order Flow</p> <p>The May 2010 Flash Crash</p> <p>Quant Trading (Stat Arb, Pairs, etc.) Trading Strategies</p> <p>Wholesalers (Internalizers), Payment for Order Flow</p> <p>HFT, Colocation, Latency Arbitrage, Front Running</p> <p>Market Structure, Fragmentation, Spreads, Volatility</p> <p><i>Flash Boys</i> – Are Markets Rigged?</p>
Topic 12	After the Trade	<p>What is clearance and settlement</p> <p>What are CUSIPs, LEI</p> <p>What are T+1 and T+3 processes</p> <p>What are the functions of a prime broker and custodian</p> <p>ISO 20022</p>