Financial Information Systems  
INFO-GB.3350  
INFO-UB.0050  
Fall 2020 – Preliminary

Instructor | Bernard S. Donefer  
http://pages.stern.nyu.edu/~bdonefer/

Class Meetings | Wednesday 6:00 – 9:00 pm  
On-line Only via Zoom

Email | bdonefer@stern.nyu.edu

Course Website | NYU Classes

Office Hours | Via email or Zoom/Skype/FaceTime by appointment

For Fall 2020 this class will be on-line only. I plan to record some lectures to be posted before each class. These recordings, as well as the readings and class notes can be viewed at your convenience prior to our class. I expect that this will shorten the class Zoom meetings on Wednesday evenings.

Even 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 automated market makers. We have 11 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, mobile payment products and Bitcoin. 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 three primary topics, describing industry practice and their underlying technology:

1. Payment systems, institutional and retail
2. Internet transaction security, cryptography, digital signatures, TLS, Blockchain, Cryptocurrency, other applications
3. Securities markets, electronic trading, high frequency trading
PREREQUISITES

One course in investments, equities, fixed income, etc. or equivalent personal experience would be beneficial. If you have any questions, please contact me.

TEACHING MATERIALS

- NYU Classes website for this course will contain lecture materials and late breaking news
- Readings will be posted on NYU Classes at least a week early and should be read prior to class each class. THERE IS NO TEXT BOOK for this course.
- Students are encouraged to find current materials in the news or on the Internet for class discussion.
- Industry speakers will be invited periodically. Their materials will also be posted on NYU Classes.

GRADING (Tentative)

<table>
<thead>
<tr>
<th>Item</th>
<th>Grade</th>
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<tbody>
<tr>
<td>First Quiz – Intro and payment systems</td>
<td>30%</td>
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<tr>
<td>Second Quiz – Internet security, blockchain, crypto</td>
<td>30%</td>
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<tr>
<td>Third Quiz – Financial markets</td>
<td>30%</td>
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<tr>
<td>Assignments and class participation</td>
<td>10%</td>
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Quiz study guides will be posted and quiz dates will be announced in class.

CLASSROOM BEHAVIOUR

Default Policies for Stern Courses are incorporated by reference:

https://www.stern.nyu.edu/portal-partners/current-students/undergraduate/resources-policies/academic-policies

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

As this will be an on-line class, I ask that you logon on time. Attendance will be taken. If you are unable to attend a class please email me in advance. If you are in a time zone such as Europe, where the class session starts at midnight please let me know. We can discuss alternatives for class attendance.

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.
If you have a qualified disability and will require academic accommodation during this course, please contact the Moses Center for Students with Disabilities (CSD, 998-4980) and provide me with a letter from them verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.

Your e-mail address

Be sure your email address in NYU Classes is correct. I will use it to communicate timely information about the course.
## Preliminary Class Schedule

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

**Topics do not equate to class meetings.**

Changes will be posted on NYU Classes

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Questions</th>
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</table>
|      | Course Logistics | Using Zoom.  
What’s this course about?  
How are the teaching materials organized? What is the grading policy? How should we communicate? |
| Topic 1 | Introduction Financial Services - Banks | How is the financial services industry organized?  
Money and banking functions and history  
What is the history and economics of various payment methods? |
| Topic 2 | Payment Systems I | What is the history and economics of various payment methods?  
Cash, debit cards, credit cards  
How are payments processed in the US? ACH  
What has the experience been with emerging payment systems, Paypal, EMV, Square, EZpass, Metrocard, Zelle, Venmo, etc. Alipay, mPesa, etc. |
| Topic 3 | Payment Systems II | Institutional high value payments via Fedwire, CHIPS and SWIFT. Bangladesh Central Bank Hack ISO 20022 standards |
| Topic 4 | Internet Transaction Security | 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  
Building an exchange on a blockchain |
| Topic 6 | Smart Contracts and Blockchain Use Cases | Smart contracts Ethereum EMV  
Initial coin offerings (ICOs)  
Proof of concept blockchain use cases |
| 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 |
|      | Introduction to Markets | Markets and Price Discovery  
Market Data and the SIP  
Market Indices  
Order and Execution Management Systems (OMS/EMS) |
| Topic 8 | US Equity Markets | What was the history of the NYSE  
How is the floor organized in posts and booths  
What is a seat  
Who are the people on the floor, brokers, (house and S2) and the specialists  
What is the trading process  
How did abuses and regulation drive it  
Reg 390, Reg ATS and decimalization, Implications of Reg NMS  
What happened in 2005 – the new NYSE Group  
Merger with Arca Exchange  
DMMs, SLPs – the new trading process  
Future of the NYSE |
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<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Questions and Notes</th>
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<tbody>
<tr>
<td><strong>Topic 9</strong></td>
<td>US Equity Markets II</td>
<td>What is the history of NASDAQ&lt;br&gt;How does its multi-dealer model work; What is its trading process and rules&lt;br&gt;How does an order book work&lt;br&gt;What was the impact of ECNs&lt;br&gt;Maker-taker model&lt;br&gt;Acquisitions of INET and BRUT by NASDAQ&lt;br&gt;What happened when NASDAQ became an “exchange”&lt;br&gt;The Trade Reporting Facility (TRF)&lt;br&gt;What are NASDAQ’s future plans?&lt;br&gt;Bulletin Board and Pinksheets</td>
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<td><strong>Topic 10</strong></td>
<td>Institutional Trading</td>
<td>The institutional search for liquidity&lt;br&gt;Transaction Cost Accounting (TCA)&lt;br&gt; Benchmarks, VWAP, implementation shortfall etc. and post trade analytics&lt;br&gt;Dark liquidity, dark pools&lt;br&gt;Alternative Trading Systems e.g., Liquidnet, BIDS, LEVEL, etc.&lt;br&gt;Market Structure 13 Exchanges and 50+Dark Pools and internalization&lt;br&gt;Algorithmic trading by institutions</td>
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<td><strong>Topic 11</strong></td>
<td>Low latency Trading and the Flash Crash</td>
<td>Automated Market Making&lt;br&gt;The May 2010 Flash Crash&lt;br&gt;Quant Trading (Stat Arb, Pairs, etc.) Trading Strategies</td>
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<td><strong>Topic 12</strong></td>
<td>HFT and Are US Equity Markets Rigged?</td>
<td>Payment for Order Flow&lt;br&gt;Wholesalers (Internalizers)&lt;br&gt;HFT, Colocation, Latency Arbitrage, Front Running&lt;br&gt;Market Structure, Fragmentation, Spreads, Volatility&lt;br&gt;International Views on HFT</td>
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<td><strong>Topic 13</strong></td>
<td>After the Trade</td>
<td>What is clearance and settlement&lt;br&gt;What are CUSIPs, LEI&lt;br&gt;What are T+1 and T+3 processes&lt;br&gt;What are the functions of a prime broker and custodian&lt;br&gt;&lt;br&gt;<strong>OPTIONAL - If We Have the Time</strong>&lt;br&gt;&lt;br&gt;<strong>Optional</strong>&lt;br&gt;&lt;br&gt;<strong>Forex</strong>&lt;br&gt;How is foreign exchange traded?&lt;br&gt;How to read FX rates&lt;br&gt;What are FX forwards&lt;br&gt;How are forward rates calculated?&lt;br&gt;How are FX rates related – purchasing power parity&lt;br&gt;How are cross rates calculated?</td>
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<td><strong>Futures</strong>&lt;br&gt;What are futures?&lt;br&gt;How are they traded and settled?&lt;br&gt;What is in the futures contract&lt;br&gt;How are they valued?&lt;br&gt;What are the margin requirements?&lt;br&gt;What is the difference between forwards and futures?</td>
<td>&lt;br&gt;&lt;br&gt;<strong>Options</strong>&lt;br&gt;What are options&lt;br&gt;How are they traded and settled?&lt;br&gt;How are they valued – Black Scholes model?&lt;br&gt;What are the Greeks?&lt;br&gt;How do futures and options differ?</td>
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