FINTECH RISK MANAGEMENT
INTA-GB 2312.30
PRELIMINARY SYLLABUS
SPRING 2019

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Meeting time & location:  Wednesday 6-9pm, Location: TBD

DESCRIPTION OF THE CLASS

This class explores how FinTech changes the practice of risk management. Risk management requires understanding, measuring, and managing market risk, credit risk, liquidity risk, and operational risk. The class presents the technology behind enterprise risk systems and shows how to manage risk using quantitative models. We consider how recent FinTech innovations such as blockchains, mobile technologies, etc., can change the way these risk systems operate, and create a new demand for talent in risk departments. We also study the specific risk management and regulatory challenges faced by FinTech firms.

The class has two main objectives. The first objective is to introduce the principles of risk management that anyone working for a financial firm needs to understand. The second objective is to discuss specific opportunities and challenges created by the use of new technologies in finance. Here are some examples:

- FinTech customers expect real-time responses to their requests (for a loan, etc.) which means risk management must be able to assess risks automatically in real time
- Cyber security risks are more important in a connected world
- New algorithms can be used for underwriting, monitoring and fraud detection

Financial technology has gone through three major stages. In 1960s and '70s, back office paper based processes migrated to mainframe computers, using standard CUSIP’s and equity clearing houses and depositories. The second stage used PCs, communications networks to address the front office, FIX standards brought online banking, trading and electronic markets. The third, and the subject of our class, is “fin-tech”, where innovative use of technology disrupts existing financial processes and businesses.

Entrepreneurs create new business models with relatively modest capital investment using new technologies: broadband internet, Wi-Fi, mobile computing, cloud storage and “free” platforms such as Python and Linux. Major banks, securities and insurance firms research these same opportunities looking to protect their own revenue by creating competing products or acquiring interesting startups.
PREREQUISITES

The material covered in Foundations of Finance is a prerequisite for this class. In addition, you should be familiar with the following topics:

- Statistics concepts such as expected value, standard deviation, and percentiles. You need to know how to compute them in a spreadsheet.

PRIMARY TEXT AND READINGS

There is no required text for this course. Both readings and cases, as well as class notes will be provided on NYU Classes for each topic in the syllabus prior to each class.

RECORDING CLASSES AND EMAIL

All classes are recorded and will be available to you on NYU Classes.

Be sure your email address in NYU Classes is correct. We will use it to communicate timely information about the course. To update your e-mail address in NYU Classes, log into NYU Home at https://home.nyu.edu/. Click Preferences at the top of the screen and then edit your Directory Address, which will be reflected in NYU Classes within 24 hours.

GRADING

At NYU Stern, we strive to create courses that challenge students intellectually and that meet the Stern standards of academic excellence. We will use the following grading guidelines for this course. Grades of “A” or “A-” will be awarded to approximately 35% of students. Your final grade will be based on:

- Homework assignments and class participation: 30%
- One quiz 35%
- One final exam (take-home) 35%

DEFAULT POLICIES FOR STERN COURSES

Laptops, Cell Phones, Smartphones, Recorders & Other Electronic Devices

*May not be used in class.* You must TURN OFF all devices BEFORE class. 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. If you are on-call for work or family, just place your device on vibrate and leave the room before taking the call.
ATTENDANCE

Required and part of grade.

I will excuse absences and entertain requests to change exam and assignment due dates only in cases of documented serious illness, family emergency, religious observance, or civic obligation. If you will miss class for religious observance or civic obligation, you must inform me no later than the first week of class. Recruiting activities, business trips, vacation travel, and club activities are not acceptable reasons for absences or requests to reschedule exams and assignments.

ARRIVING LATE, LEAVING EARLY, COMING & GOING

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. Students are expected to arrive to class on time and stay to the end of the class period.

Arriving late or leaving class early may impact the course grade. Students may enter class late only if given permission by the instructor and can do so without disrupting the class. (Note that instructors are not obliged to admit late students or readmit students who leave class.)

GENERAL BEHAVIOR

You may eat in class as long as it is not odiferous or noisy. There will be a break at about 7:30 when you can get "dinner". Please clean up and throw away all trash.

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

Students will conduct themselves with respect and professionalism toward faculty, students, and others present in class and will follow the rules laid down by the instructor for classroom behavior. Students who fail to do so may be asked to leave the classroom. (NYU Stern Code of Conduct).

DISABILITY

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.
COURSE CONTENT

The course is organized in two parts. Prof. Donefer will teach the first 6 sessions and Prof. Pinedo the remaining 6 sessions. The first half introduces the building blocks of fintech risk management. The second half focuses on selected topics related to FinTech and risk management including data mining and machine learning with applications in operational risk and credit risk.

Session 1 (Feb. 13): What is Fintech?
- Differences with traditional banking, securities and insurance businesses.
- Robo advisors, systematic trading, insurance products
- Why is FinTech happening now?
- The cost structure of traditional financial services vs. fintech

Session 2 (Feb. 20): Basics of Financial Risk Management: Overview of all different types of risks
- Basic review of market, credit, liquidity and operational risk
- How do they relate to new FinTech paradigms compared to “old” finance
- Building a Monte Carlo simulation to estimate market risk
- Use of stress testing vs. analytical models

Session 3 (Feb. 27): Payment Systems: retail and institutional
- Credit and Debit Cards
  - Automated Clearing House (ACH)
  - Chip cards, PCI compliance
  - New Models, PayPal, NFC, EMV, Apple Pay, Venmo, Zelle
- Fedwire, CHIPS, SWIFT and their risk controls

Session 4 (Mar. 6): Online Security and Encryption
- Secret key, public key encryption (RSA, ECC)
- Hashing and digital signatures
- SSL/TLS internet security

Session 5 (Mar. 20): Blockchain, applications, including cryptocurrencies
- Distributed ledgers, peer to peer computing, hash pointers
- The blockchain under the covers, how it actually works
- Crypto currencies and initial coin offerings (ICOs)
- Smart contracts
- Blockchain proof of concept examples
Session 6 (Mar 27): Cybersecurity
- Cyber Threat Identification
- Security risk analysis – Cyber kill chain
- Cyber Defenses
- Fundamental Security Design Principles

- History of Oprisk, Different Aspects of Oprisk.
- Basel II, III.
- LDA (frequency and severity distributions), AMA, SMA.
- Key Risk Indicators,
- Interactions between Oprisk, Market Risk and Credit Risk

Session 8 (Apr 10): Oprisk in Fintech:
- Oprisk in algorithmic trading (flash crashes) and robo-investing,
- Oprisk in peer to peer lending, crowdfunding,
- Cybersecurity
- Crypto-Currency exchange hacks.

Session 9 (Apr 17): Data Acquisition and Data Mining.
- Multi-factor analysis,
- Central Limit Theorem, Extreme Value Theorem.
- Internal Data versus External Data.

Session 10 (Apr. 24): Machine Learning Applications in Fintech
- Neural nets, BBN, SVM.
- Applications of Machine Learning to marketing of financial products.
- Applications to fraud detection.

Session 11 (May 1): Intro to Credit Risk and Credit Risk in Fintech:
- Peer to peer lending.
- Crowdfunding.

Session 12 (May 8): Data-Driven Investment Strategies for Peer-to-Peer Lending.
- The Lending Club Case (Cohen, Guetta, Jiao, Provost)