“FinTech” refers to financial sector innovations involving technology-enabled business models that can facilitate disintermediation, revolutionize how existing firms create and deliver products and services, address privacy, regulatory and law-enforcement challenges, provide new gateways for entrepreneurship, and seed opportunities for inclusive growth.

This introductory course brings a 360° view on FinTech. Firstly, we’ll explore the emergence of new business models in various areas of banking, insurance and wealth management. Secondly, we’ll focus on how the technological advance in data and analytics are enabling the financial sector innovations. A special attention will be devoted to BlockChain, the ‘internet of finance’ and its potential of further transforming the sector. Lastly, we would deal with the increasing security and privacy concerns, operational risks as well as social challenges that emerged as part of the FinTech transformation.

The course will study:

- The unique characteristics of financial innovation. How is it evolving? and; What are the light sides and dark sides of financial innovation?
- How is FinTech reconfiguring financial services business models? What are the key disruption points? What determines success in FinTech?
- Will traditional financial intermediaries be able to adapt? Or will upstart FinTechs disrupt them, re-imagining business models just as Amazon reshaped book-selling and Uber transformed taxi-rides?
- What are the critical technology strategies and foundational technologies in FinTech?
- What are the core and novel sources of FinTech data, how are they managed?
- What are the primary FinTech data science methods and tools? How do they apply to real FinTech problems and questions today?
- Where are the limits, risks, and broader policy and social implications of FinTech?
Syllabus

I. The FinTech opportunity to improve the Financial System

Following 2008 financial crisis and the successful transformations of advertising, e-commerce and other industries, the rise of FinTech was both inevitable and natural. In this part of the course we’ll describe the reasons, enablers, traits, consequences and future of Financial sector transformation. We shall present use cases from various business lines within Financial Sector.

Reading

• “Digital Disruption - How FinTech is Forcing Banking to a Tipping Point”, Citi GPS: Global Perspectives & Solutions, Mar 31st, 2016 - https://ir.citi.com/D%2F5GCKNwuoSvhbvCmUDS05SYsRaDvAYkPjb5subGr7f1JM e8w2oX1bqpFm6RdjSRSpGzSaXhyXY%3D

• “Digital Disruption – Revisited - What FinTech VC investments tell us about a changing industry”, Citi GPS, Global Perspectives & Solutions, Jan 23rd, 2017, https://ir.citi.com/FlanoC50Aw5dWM7kPzoLKU3buhKF1ETHM1deMYw1%2F2z NzWFg8zmYw%3D%3D


II. “Data is giving rise to a new Economy”

Data and analytics are driving the ‘fourth industrial revolution’. Accelerated pace of digitization, increasing number of connected objects, and immense progress in cloud and data technologies are among its main drivers. This section of the course will deal with its applications in financial sector.

This introductory session to data and analytics will describe how data is gaining increasing importance, to the point it is reshaping most, if not all, ‘traditional industries’ and hence has become itself a ‘theme’ of a new virtual economy.

Reading


• “The Human Face of Big Data”, April 10th 2014, Produced by Sandy Smolan & William Medsker, https://www.youtube.com/watch?v=TEUvMzDhvmo

III. Intro to Artificial Intelligence

The use of artificial intelligence, once “reserved” for tech giants like Google, Apple, Facebook and others, is making inroads to date into most industries. According to Andrew NG, former chief data scientist at Baidu and now co-founder of Coursera: “AI will transform most if not all industries in the next several years”. Startups have been playing a major role in developing innovative ways of using data. Since 2012, more than 200 AI startups have been acquired, and $15.4B raised in 2320 deals. Among investors and acquirers, we would find the ‘usual suspects’: Google, Apple, Microsoft and Facebook. Interestingly, ‘traditional’ corporates like Ford, GM, GE as well as banks like Goldman, Citigroup and JPM emerge as leaders in investments.

Reading
• “Data Science and Prediction”, Dhar, V., Communications of the ACM, volume 56, number 12, December 2013
• “Introduction to Predictive Modeling: From Correlation to Supervised Segmentation”, Provost and Fawcett, Data Science for Business, Chapter 3.
• “Overfitting and its Avoidance”, Provost and Fawcett, Data Science for Business, Chapter 5.

IV. From Traditional to “Deep” Learning

Last years’ progress in artificial intelligence, enabled machines to perform tasks we didn’t imagine they could do. This session we’ll present the enabling scientific factors.

Reading
• “Neural Networks”, Dhar, V., and Stein, R., from Seven Methods for Transforming Corporate Data into Business Intelligence, Chapter 6, Prentice-Hall, 1997.

V. Robo-Advisors reshaping millennials’ management of wealth

Digitization of services is now making inroads in the once very traditional wealth management industry. According to surveys, and following the success of startups like Betterment and Wealthfront, millennials are trusting robots in managing their wealth.
• CBinsight, “We Analyzed 7 Of The Fastest-Growing Personal Finance Apps Of All Time To Figure Out The Secrets To Their Success — Here’s What We Learned”, Oct 10th, 2017, https://www.cbinsights.com/research/personal-finance-apps-strategies/?utm_source=CB+Insights+Newsletter&utm_campaign=2e6cf4a7b4-WedNL_11_29_2017&utm_medium=email&utm_term=0_9dc0513989-2e6cf4a7b4-89214361

VI. “Single Click” Loans

Digitization and abundance of data and are presenting tremendous opportunities for Point of Sale Financing (POSF).
• “Blue Ocean Lending for Credit Unions: Point of Sale Financing”, George Hofheimer and Linda Young, May 19th, 2015, https://filene.org/research/report/blue-ocean-lending-for-credit-unions-point-of-sale-financing

VII. Digitization of Trading

Trading used to be reserved for professionals. This session will demonstrate how digitization and availability of data are transforming Capital Markets.

Reading


VIII. “Surprise and delight your customers by going beyond their expectations”.

The digital disruption has challenged sellers by ‘distancing’ them from their customers. Google has demonstrated how despite the increasing abundance of data, searching online can be easy and natural. This session will deal with the means and challenges to use data and analytics to overcome the ‘digital barrier’. We shall demonstrate in class the use of recommender systems.

Reading
• “Recommender Systems”, Machine Learning Summer School 2014 @ CMU https://www.slideshare.net/xamat/recommender-systems-machine-learning-summer-school-2014-cmu

IX. Differential pricing – legit or not?

To date, we are all aware that next to us in the airplane, might be sitting someone who have paid her ticket significantly less than us. Are differential prices for airplane fares different than banking commissions? This session will deal the delicate issue of pricing.

Reading
• “Different customers different prices thanks to big data”, Adam Tanner, Forbes, 2014, https://www.forbes.com/sites/adamtanner/2014/03/26/different-customers-different-prices-thanks-to-big-data/#3ae81c515730
• “The secret of airbnbs pricing algorithm”, Dan Hill, iEEE Spectrum, 2015, 
• “Big Data and Differential Pricing”, Obama White House Archives, Feb 2015, 
  https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/docs/Big_Data_Report_Nonembargo_v2.pdf

X. Bitcoin cryptocurrency and payment system de-mystified

Bitcoin is reaching new records, startups are raising unprecedented amounts via ICO and countries are issuing Cryptocurrencies. Undoubtedly, 2017 has been an instrumental year in adoption of Blockchain and other distributed ledgers based applications. Is it a hype? or are we witnessing a fundamental change in the way communities interact economically? In this session, we’ll use Bitcoin to explain BlockChain.

Reading

• “The Essence of the Blockchain”, Michael Scott, 30 Aug 2016, 
  http://www.miracl.com/hubfs/block.pdf?hsCtaTracking=41b86e7e-0bc6-48f0-889a-61bd43021a32%7Cab2522ad-e26f-4487-b0f3-b251481190c8
• “How Bitcoin Works Under the Hood”, Scott Driscoll, 
  https://www.youtube.com/watch?v=Lx9zgZCMqXE

XI. ‘Smart Contracts’ using a distributed ledger

In late 2013, Vitalik Buterin, a young Russian-Canadian software engineer founded the Etherium project, an open-source, public, blockchain-based distributed computing platform featuring smart contract functionality. Following the presentation of Etherium project, we’ll deep dive into the DAO hack story.

Reading

• “Ethereum, a Virtual Currency, Enables Transactions That Rival Bitcoin’s”, New York Times, March 27, 2016, 
• “Understanding the DAO Hack for Journalists”, David Siegel, 19 Jun 2016, 
  https://medium.com/@pullnews/understanding-the-dao-hack-for-journalists-2312dd43e993
• “The Ether Thief”, Matthew Leising, Bloomberg Markets, June 13th, 2017, 
  https://www.bloomberg.com/features/2017-the-ether-thief/
XII. Cryptocurrency Ecosystem - present and future

Bitcoin and Etherium are 2 out of +13k (and growing…) cryptocurrencies. This session will present the entire eco-system and discuss various views about its future.

Reading

- “What is an ICO (Initial Coin Offering) and How does it work?”, Bob Mason, FXEmpire blog post, June 2017, https://www.fxempire.com/education/article/ico-initial-coin-offering-work-418446
- “Ten years in, nobody has come up with a use for blockchain”, Kai Stinchcombe, Dec 2017, https://hackernoon.com/ten-years-in-nobody-has-come-up-with-a-use-case-for-blockchain-ee98c180100

XIII. “Risk and high risk: Walking the GDPR tightrope”

Corporates are collecting and analyzing increasing amounts of customers’ data to improve their services and gain efficiencies. Conscious of the tension between enterprises need to use data and the risk of privacy violation, the EU parliament has approved in 2016 a comprehensive data protection directive. This session will use the EU GDPR to present the privacy risks from data usage and their possible mitigation.

Reading


XIV. AI-based Crime Prevention.

Criminals’ sophistication and regulatory requirements keep evolving. Effectivity of ‘rule based’ protection systems is declining, creating a need for new generation of systems using artificial intelligence for analysis and leveraging new sources of data.

Reading
• Wired, “That insane, $81M Bangladesh bank heist, here’s what we know”, Kim Zetter, 17th May, 2016

XV. Social implications of FinTech Transformation

FinTech transformation has a significant impact on society. In this session we shall discuss and analyze the various implications and the way to address them.

Reading


Course Grading Method

• 4 Assignments per each part of the course: 4x10% = 40%
• Mid-term Exam: 20%
• Final Exam: 40%