FNCE 780
FinTech: Business, Finance and Technology

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Overview

Technology is playing an increasingly dominant role in the financial service industry. It is changing how existing players operate and it is creating new ways to deliver core services like saving, investing, borrowing, and insuring. The course provides an overview of the most significant technological advances that are radically changing the industry, focusing on AI and Blockchain. We will analyze how these technologies create value in the financial industry by lowering frictions — from unit processing cost, through asymmetric information and network effects.

The course will integrate a strategic discussion of the competitive landscape and the market opportunities for new entrants, with an in-depth understanding of the technologies and their applications. The course starts with an overview of the field and its driving forces, including regulation, and provide a framework for understanding the strategic role of technology. We will then proceed to discuss the role of information processing in the context of lending and the use of machine learning in this area. Next, we proceed to discuss the premise behind blockchain, understand the structure of the bitcoin blockchain, and conclude with a discussion of ethereum and decentralized finance (DeFi), built on it.

Requirements

To understand how technology is being used in these applications, we will apply a variety of tools to real world data. <u>Programming knowledge is not a prerequisite but a desire to acquire that skill is</u>. We will be using R, a robust open-source programming language for that. To make the best of out of the course, students are advised to acquire some basic R skills from online resources, supplied materials, and optional review sessions. More advanced application will be articulated through examples in class.

To better prepare for the course, students are advised to take either:

1. "**Intro to R Bootcamp**" offered by the Wharton Consumer Analytics (see https://wca.wharton.upenn.edu/learn-analytics/online-courses-and-workshops/). This is a self-guided, online course, open to all Penn students, that is not a credit course.
2. "**Statistical Computing with R**" (STAT405) offered by Wharton as a 0.5 credit course (see https://apps.wharton.upenn.edu/syllabi/?course=STAT405). The course introduces students to the R programming language and related eco-system in the context of business and research applications.

Course Structure

The course mixes standard lecture, examples, cases, and guest lectures. Student are expected to work in teams and demonstrate a high level of independent learning and initiative. The course' goal is to provide students with in-depth understanding of how to integrate these technologies/analytics into new business ideas and help them be effective managers in an environment where these technologies are strategic to the organization.

At the beginning of the course, you will be assigned into groups of up to 4 members. At the end of the course, we will conduct a 360 survey to assess the contribution of team members to the collective effort.

Materials

All cases and reading materials will be available through Cases. Slides will be posted at least three days before class. If you would like to write on the slides, please make hard copies in advance of class. Laptops will not be allowed, unless otherwise specified for in-class coding.

Use of Generative AI

You may use generative AI programs (e.g., tools like ChatGPT) to help with coding and to generate ideas. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. Beware that blind use may also stifle your own independent thinking and creativity. In particular, please do not submit code that you do not understand in details.

You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor). Any plagiarism or other form of cheating will be dealt with severely under relevant Penn policies.

Grades

Ground rules:
- <u>Class attendance is mandatory</u>. Up to two absences are excused. More than four absences/late attendances will automatically result in a failure grade.
- <u>On time arrival</u>. Please be at your pre-assigned seat on time. Late arrival will be marked as an absence.
- <u>No laptops</u>. If you would like to take notes / annotate the slides, please make hard copies in advance of class, or use a tablet. Laptops will not be allowed, unless otherwise specified for in-class coding.

Grades will be determined based on:

(I) **Class Participation — 15%**

The course is heavily predicated on in-class discussion. Thus, you are expected to attend all sessions and take an active role in class. To obtain maximal class participation grade, you are expected to (1) participate in a way that promotes collective learning, and (2) be

prepared to discuss and share your analysis/insights about the assigned readings.

(II) **Cases — 20%**

Everyone needs to prepare for the in-class discussion of <u>all the cases</u>. <u>I may cold call students with questions about the case</u>. You are expected to submit an in-depth analysis in groups of up to 3 students. The analysis should not exceed 3 pages each.

(III) **Group Assignments — 15%**

The group assignments give you an opportunity to apply the tools we discuss to real-world applications and data. Each assignment corresponds to a main course module.

(IV) **Exam — 50%**

The exam will take place in class on <u>2/27/2024</u>. Please note the scheduling of the exam. You are responsible for ensuring that you are available to take the exam as <u>no make-up exam will be offered</u>.

Preliminary Meetings' Outline[1]

Class	Date	Topic	Case / Data	Due Dates
		Overview		
1	1/16/24	What is FinTech?		
2	1/18/24	Regulatory approach to FinTech and the role of BigTech	• Case: "FinTech and Finance Transformation: the Rise of Ant Financial Services" (NUT-144)	Case I Due (in class)
		Machine Learning and Credit Markets		
3	1/23/24	Household lending market Modeling defaults	• Lending Club loan-level data	
4	1/25/24	Loan data visualization and marketplace lending	• Case: "Lending Club" (E-597)	Case II Due (in class)
5	1/30/24	Machine learning in lending: Random Forest MPL from investors' perspective		
6	2/1/24	AI and XAI in lending		
7	2/6/24	*Guest speaker*		
		Blockchain and Decentralized Finance		
8	2/8/24	Blockchain overview Blockchain-relevant cryptography		Assignment I Due
9	2/13/24	Bitcoin blockchain — transactions, blocks and consensus		

[1] In addition, optional recitation sessions with examples on data manipulation and analytics examples will be held during the first half of the course.

Class	Date	Topic	Case / Data	Due Dates
10	2/15/24	Ethereum and Decentralized Finance (DeFi)	• Case: "R3: Putting the 'Fin' Back in FinTech" (IN1544)	Case III Due (in class)
11	2/20/24	*Guest speaker*		Assignment II Due
	Summary			
12	2/22/24	Takeaways and future directions		Case IV Due (in class)
13	2/27/24	Exam		