

# **FNCE 885**

## **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. We will do so by focusing on three areas in which these technologies are driving change: (I) Lending, (II) Clearing (III) Trading. In each of these areas, we will cover examples and developments from (1) marketplace lending, (2) blockchain and distributed ledgers, (3) quantitative investing and its use of non-standard data and analytics. In each of these areas, we start by analyzing the marketplace, the incumbents, and the strategies of the incoming technology-based new entrants. We then proceed to understand the relevant technological applications in each area using real-world data.

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## Requirements

To understand how technology is being used in these applications, we will apply a variety of tools to real world examples and data. Programming knowledge is not a prerequisite but a desire to acquire that skill is. 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.

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## 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.

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## Materials

You will need to purchase the cases (available online), individually or as a group.

Additional reading materials will be distributed on Canvas. I will make hard copies of the slides available at the beginning of class.

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## Grades

Grades will be determined based on:

**(I) Class Participation — 30%**

Class attendance is mandatory. The course is heavily predicated on in-class discussion. Thus, you are expected to attend all sessions and take an active role in class.<sup>1</sup> 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 — 15%**

Everyone needs to prepare for the in-class discussion of all the cases. You are expected to submit an in-depth analysis of at least two of the four cases discussed in the course in groups of 3-4 students. The analysis should not exceed 3 pages each. If you submit reports for more than two cases, your top two case reports' grades will be considered.

**(III) Group Assignments — [0% - 15%]**

The **optional** 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. You can work in groups of up to 3-4 students each. Any points you accumulate via the assignments will be credited toward the weight of the final exam. For example, imagine that you submit two of the three assignments and you receive full credit for both. Your final exam weight will be reduced by 10% and you receive a max score for 10% of the course grade.

**(IV) Final Exam — [40% - 55%]**

The exam will take place in class during our last session, 3//2020. Please note the

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<sup>1</sup> Up to two absences are excused. More than six absences will automatically result in a failure grade.

scheduling of the exam. You are responsible for ensuring that you are available and on campus to take the exam as no make-up exam will be offered. The weight of the exam will vary based on the number of group assignments you submit, and your grade on these assignments (see part III).

Preliminary Meetings' Outline<sup>2</sup>

Class	Date	Topic	Case / Data	Due Dates
<b>Overview</b>				
<b>1</b>	1/14/21	What is FinTech?		
<b>2</b>	1/19/21	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)
<b>Lending</b>				
<b>3</b>	1/21/21	Household lending market Modeling defaults	• Lending Club loan-level data	
<b>4</b>	1/26/21	Loan data visualization Market place lending	• Case: "Lending Club" (E-597)	Case II Due (in class)
<b>5</b>	1/28/21	Machine learning in lending: Random Forest MPL from investors' perspective		
<b>Clearing</b>				
<b>6</b>	2/2/21	Blockchain overview Blockchain-relevant cryptography		Assignment I Due @8PM
<b>7</b>	2/4/21	Blockchain — networks and incentives		
<b>8</b>	2/9/21	Blockchain — applications	• Case: "R3: Putting the 'Fin' Back in FinTech" (IN1544)	Case III Due (in class)
<b>9</b>	2/11/21	<i>Guest speaker</i>		

<sup>2</sup> In addition, an optional recitation session with examples on data manipulation and analytics examples will be held during the first two weeks of the course.

Class	Date	Topic	Case / Data	Due Dates
<b>Trading</b>				
<b>10</b>	2/16/21	A new age of quantitative trading		Assignment II Due @8PM
<b>11</b>	2/18/21	Machine Learning in trading: Lasso and Ridge	• US Industry Equity Returns	
<b>12</b>	2/23/21	Crowdsourced trading	• Case: “Quantopian: a New Model for Active Management” (9-218-046)	Case IV Due in class
<b>13</b>	2/25/21	<i>Guest speaker</i>		
<b>Wrap-up</b>				
<b>14</b>	3/2/21	Final Exam		Assignment III Due @8PM

## Reading List

Class	Title	Recommended / Required	Type
1	Has the US Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation	Recommended	Academic Paper
1	CFA finance exams to grill hopefuls on AI, big data and robo-advice	Recommended	Article
1	An earthquake in European banking	Recommended	Article
1	The Pulse of FinTech / KPMG	Recommended	Industry report
2	FinTech and Financial Transformation	Required	Case
2	U.S. Department of the Treasury, July 2018 Report, Pages 3-14	Required	Report
2	OCC Begins Accepting National Bank Charter Applications From Financial Technology Companies	Recommended	Report
2	Fintech Charter' Has No Early Takers as Lawsuit Looms	Recommended	Article
2	Everything You Need To Know About What Amazon Is Doing In Financial Services	Recommended	Article
3	Ch. 2.3, Ch. 4.1-4.3 in "An Introduction to Statistical Learning with Application in R"	Recommended	Book
4	"Lending Club" (E-597)	Required	Case
4	Annual (10-K) FY2018 report	Recommended	Other
4	US Department of Treasury: Opportunities and Challenges in Online Marketplace Lending	Recommended	Industry report
5	Ch. 8 in "An Introduction to Statistical Learning with Application in R"	Required	Book
6	Asymmetric key cryptography	Recommended	Video
6	RSA	Recommended	Video

<b>Class</b>	<b>Title</b>	<b>Recommended / Required</b>	<b>Type</b>
<b>6</b>	RSA and quantum computers	Recommended	Video
<b>6</b>	Quantum computer robust cryptography	Recommended	Article
<b>7</b>	Blockchain Technology Overview	Recommended	Report
<b>8</b>	"R3: Putting the 'Fin' Back in FinTech" (IN1544)	Required	Case
<b>8</b>	Global Blockchain Benchmarking Study	Recommended	Industry report
<b>8</b>	The future of financial infrastructure	Recommended	Industry report
<b>8</b>	Distributed Ledger Technology/ beyond block chain	Recommended	Industry report
<b>8</b>	Some Simple Economics of the Blockchain	Recommended	Academic Paper
<b>9</b>	Guest Lecture - TBD	Required	
<b>10</b>	Big Data and AI Strategies	Recommended	Industry report
<b>11</b>	Ch. 6 in "An Introduction to Statistical Learning with Application in R"	Required	Book
<b>12</b>	Why Don't We Agree? Evidence from a Social Network of Investors	Recommended	Academic Paper
<b>12</b>	Harnessing the Wisdom of Crowds	Recommended	Academic Paper
<b>12</b>	Fake News in Financial Markets	Recommended	Academic Paper
<b>12</b>	"Quantopian: a New Model for Active Management" (9-218-046)	Required	Case



Class	Title	Recommended / Required	Type
13	Guest Lecture - TBD	Required	
14	Digital Finance for All: Powering Inclusive Growth in Emerging Economies	Recommended	Industry report