

ISOM 3350 FinTech and Cryptoventures

Course Syllabus

Spring Semester 2021

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Course Prerequisites/Corequisites:

Prerequisites: ISOM 2500 - Business Statistics.

Course Description:

Recent technology innovations have changed how financial information is disseminated, processed and analyzed. Individual investors and financial institutes who quickly adapt to big data analytics and Cryptofinance will have a leading edge. The goal of the course is to equip students with highly coveted skills in the market. It will also help students understand the hype about cryptocurrencies, and envision a future of blockchain with or without cryptocurrencies.

On a higher level, this course will help students understand disruptive technologies and assess its impacts on future financial services. To this end, we will cover blockchain technology and many ventures that have already begun to capitalize on this innovation.

This undergraduate elective course provides an introduction to FinTech and cryptoventures. Topics include machine learning in financial analytics, Robo-advising, big data alpha models, algorithm trading and high-frequency trading, artificial intelligence, blockchain, cryptocurrencies, smart contracts and contract-oriented programming, markets for smart contracts and applications of blockchain technologies in various finance areas. The class will use Python and R to implement Fintech applications, and Solidity language to demonstrate smart contract development.

After completing this course, students will be able to

- Understand the alternative lending, P2P technologies and assess their impacts on traditional banking and payment industries
- Understand the blockchain technology and cryptocurrencies
- Acquire knowledge on the core and novel sources of FinTech data, data analysis, and visualization
- Acquire knowledge of critical technology strategies and foundational technologies in Fintech
- Gain experience in designing and implementing smart contracts and decentralized applications
- Understand the limits, risks and social implications of FinTech

- Be aware of the latest trends of financial services business models and the key disruption points
- Engage in the process of FinTech innovation

Recommended Textbooks:

(Note: We will depend heavily on class slides, notes, and reading materials, but the following textbooks are recommended.)

Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction

by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton University Press, ISBN-13: 978-0691171692.

Financial Analytics with R

by Mark Bennett and Dirk Hugen, 2016, ISBN 9781107150751

An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics)

by Gareth James , Daniela Witten , Trevor Hastie , Robert Tibshirani, Springer, ISBN-13: 978-1461471370.

ASSIGNMENTS AND EVALUATION CRITERIA

Grade Weights:

| | |
|---------------------|-------------|
| Class Participation | 5% |
| Assignments | 10% |
| Group Project | 15% |
| Exam 1 | 20% |
| Exam 2 | 20% |
| Exam 3 | 30% |
| Total | 100% |

Class Participation (5%): There are two aspects of your class participation. First, students are expected to participate in class activities (e.g., in-class programming exercises, self-tests, reading assignments) and attend the invited speakers’ sessions if any. In-class participation, such as raising and responding to questions, is highly encouraged; not only does it enriches your learning, but it also contributes to a more interactive environment for all.

Exam 1 (20%) and Exam 2 (20%): These are major checkpoints to ensure that you understand the key concepts and analytical tools that we introduce in this course. Review sessions and programming catch-up days will be scheduled to help you prepare for these examinations. **If you miss Exam 1 or 2** for an emergency, you can have the Exam 3 grade counts for both the missed midterm and the Exam 3. That one exam will thus constitute a greater portion of your course grade. This emergency must be approved by the instructor before the exam date, and counting one exam twice is not a good idea!

Exam 3 (30%) is the overall check for the semester and thus might be a cumulative exam.

Assignments (10%): There can be two types of assignments: programming and reports. Assignments will be graded according to accuracy and analysis.

Group Project (15%): For group proposal/reports, grades will be assigned according to your idea, execution and writing of the paper.

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Tentative Course Outline

The following outline offers a tentative 13-week plan. Deviations and revisions may be made to better facilitate learning.

| | Topic |
|----|---|
| 1 | Blockchain Technology I: Cryptographic Hash Function |
| 2 | Blockchain Technology II: Public-key Cryptography and Digital Signature |
| 3 | Blockchain Technology III: Block Building, Mining and PoW |
| 4 | Cryptocurrency I: Transactions and Wallets Programming Assignment and Demo 1: Block Mining in Python |
| 5 | Cryptocurrency II: 51 percent attack and Protocols |
| 6 | Smart Contract I: Basics |
| 7 | Smart Contract II: Lightning Network |
| | Exam I (Feb-25th) |
| 8 | Solidity Essentials |
| 9 | Solidity Dive Programming Assignment and Demo 2: Launching Your ICO Using Solidity |
| 10 | Measuring Portfolio Performance |
| 11 | Technical Analysis |
| 12 | Big Data in Finance: Factor Model 1: Risks and Premiums |
| 13 | Big Data in Finance: Factor Model 2: Factor models |
| | Exam II (Mar-25th) |
| 14 | Big Data in Finance: Factor Model 3: Text Mining |
| 15 | Text Mining in Financial News 1 |
| 16 | Text Mining in Financial News 2 |
| 17 | Group Project |
| 18 | Back-Testing |
| | Exam 3 (May-6th) |