

STA 4505H – HIGH FREQUENCY & ALGORITHMIC TRADING

INSTRUCTOR:

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SS 6005

IMPORTANT:

This course will begin Wed Feb 25, 2015, deadline to drop the course is Fri, March 6, 2015. Please read through chapters 1-4 of Shreve's book on Stochastic Calculus for finance volume 2. Spend more time on chapters 3 and 4, with a light reading of chapters 1 and 2.

CLASS NOTES / LECTURES :

Class notes and videos will be updated as the course progresses.

OUTLINE:

With the availability of high frequency financial data, new areas of research in stochastic modeling and stochastic control have opened up. This 6 week course will introduce students to the basic concepts, questions and methods that arise in this domain. We will begin with the classical market microstructure models, understand different theories of price formation and price discovery, identify different types of market participants, and then move on to reduced form models. Next, we will investigate some of the typical algorithmic trading strategies employed in industry for different asset classes. Finally, we will develop stochastic optimal control problems for solving optimal liquidation and high frequency market making problems and demonstrate how to solve those problems using the principles of dynamic programming leading to Hamilton-Jacobi-Bellman equations. Students will also have a chance to work with historical limit order book data, develop Monte Carlo simulations and gain a working knowledge of the models and methods. Tentative topics include:

- Market Microstructure
- Overview of Stochastic Calculus
- Stochastic Control & Dynamic Programming
- Optimal Liquidation
- Market Making
- Pairs Trading

GRADING SCHEME:

Here is a tentative grading scheme, we will discuss this during the first class.

Item	Grade
Participation	25%
Exam	25%
Report	25%
Presentation	25%

Report and Presentation will be based on students implementing some of the models we discuss in class as well as reporting on a collection of relevant papers.