Course Title: FE670 - Algorithmic Trading Strategies

Prerequisites: FE570 Recommended

Topics: This course investigates methods implemented in multiple quantitative trading strategies with emphasis on automated trading and quantitative finance based approaches to enhance the trade-decision making mechanism. The course provides a comprehensive view of the algorithmic trading paradigm and some of the key quantitative finance foundations of these trading strategies. Topics explore markets, financial modeling and its pitfalls, factor model based strategies, portfolio optimization strategies, and order execution strategies. The data mining and machine learning based trading strategies are also introduced, and these strategies include, but not limited to, Bayesian method, weak classifier method, boosting and general meta-algorithmic emerging methods.

Textbook:

[Required:] Frank J. Fabozzi, Sergio M. Focardi, and Petter N. Kolm, ***Quantitative Equity Investing: Techniques and Strategies*** (Wiley, 2010).

[Optional:] Barry Johnson, ***Algorithmic Trading & DMA***, 4Myeloma Press London, 2010.

Lecture Outline:

Week	Topic(s)	Reading(s)	HW
1	An Overview of Trading and Markets	Barry Johnson [1,2,3]	
2	Common Pitfalls in Financial Modeling	Frank J. Fabozzi [4]	HW1
3	Factor Models and Their Estimation	Frank J. Fabozzi [5]	
4	Factor-Based Trading Strategies	Frank J. Fabozzi [6-7]	
5	Portfolio Optimization & Black-Litterman Model	Frank J. Fabozzi [8-9]	HW2
6	Robust Portfolio Optimization	Frank J. Fabozzi [10]	
7	Transaction Costs & Trade execution	Frank J. Fabozzi [11]	HW3
8	Transaction Costs & Optimal Strategies	Barry Johnson [7,9]	EXAM-I
9	Order Placement & Execution Tactics	Barry Johnson [8,9]	Project Proposal Due
10	Enhancing Trading Strategies	Barry Johnson [10]	
11	Pattern Recognition Models: Bayesian Networks, Hidden Markov Models	Academic papers	
12	Pattern Recognition Models: Decision Trees, Boosting, Bagging, & Random Forests	Academic papers	HW4
13	Pattern Recognition Models: Support Vector Machine & Reinforcement Learning. Switching Experts	Academic papers	
14	Project Presentation		Project Report Due
15	Final Project		EXAM-II

Exams and Grades:

Assignment	Grade Percentage
Assignments	30%
Final Project	30%
Midterm exam	30%
Paper reivews	10%
Total Grade	100%

Exams: Two Exams. (Mid-term) EXAM **I**: **Oct 17 -** (Thursday). (Final Presentation) EXAM **II**: **Dec. 12** - (Thursday).

Exam Honor Policy: You are not allowed to discuss any of the exam questions with one another or to show any of your solutions. The work must be done **independently** and **pledged**.

Homework: There will be **4 homework assignments** (approx every 2-3 weeks).

Homework Honor Policy: You are allowed to discuss the problems between yourselves, but once you begin writing up your solution, you must do so independently, and cannot show one another any parts of your written solutions. The HW is to be **pledged** (that it adheres to this).

Final Project: You need to form a project team with 3-4 people at most. You will pick a topic related to the course content, and an one-page project proposal needs to be submitted right after the midterm. If you do it right, this can be an immensely satisfying experience. You will turn in this project - I don't want the computer output, but descriptions of the results IN YOUR OWN WORDS - 3 single spaced pages, including plots, at most. We will talk more about this as the semester proceeds. You will each give a brief presentation on your project to the class, during the last week - Attendance is MANDATORY at the presentations – **Dec 05** (tentatively)!!!

Attendance: Attendance will be taken randomly (e.g., 6-7 times during the semester) and will determine "which direction" the resulting grade will “fall”, for those grades, which are borderline (e.g., between B+ or A-).