SYLLABUS FOR F535 SECURITY TRADING AND MARKET MAKING

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COURSE DESCRIPTION

Welcome to *Security Trading and Market Making* at Indiana University! For simplicity, most finance courses assume that securities trade in an idealized costless, frictionless world. In reality there are many frictions: bid-ask spreads, trade impact on price, brokerage commissions, quantity limitations, time delays, etc. This field of study is known as "market microstructure." Microstructure is an important subdiscipline of finance and has had a profound impact on the real world. For example, one research study uncovered evidence of implicit collusion by NASDAQ dealers. This led to a class action lawsuit that was eventually settled when 30 brokerage firms paid a total of $1 billion in damages!

TEACHING STYLE

My approach to teaching involves four key features:

1. **Assignment Preparation.** Students are expected to read the assigned readings in advance and come to class ready to discuss them.

2. **Class Participation.** Students are expected to play a primary role in explaining the assigned readings, expressing their opinions, asking questions, and contributing to the class discussion. This "active learning" approach is student-centered, as opposed to professor-centered (where the professor simply lectures). I will frequently ask for voluntary contributions. I will frequently cold call on students to insure that everyone participates. Each time that I call on you, either as a volunteer or as a cold call, will count towards your class participation score. Attendance does *not* count.

3. **Clicker Participation.** I will frequently ask clicker questions to the entire class. *All* students are asked to respond to these questions using their clickers. Two points will be given for a correct response and one point for an incorrect response. Total clicker points will be scaled to fit the grading scale listed below. Let me know if you change clicker devices so that I can track you and give you credit. No allowance will be made for forgotten clickers, battery failures, or events (e.g., interviews, etc.) that might lead you to miss class. It is your responsibility to make sure that you have a functioning clicker device available for class and to accept any tradeoffs that you make in missing class. Clicker responses are individual. You are not allowed to consult or coordinate with others. You are not allowed to submit clicker responses for others. We will use clicker channel 35.

4. **Learn By Doing.** The best way to learn how to trade is to actually do (simulated) trades. The best way to learn how to present your ideas to others is to actually present your ideas to others. Therefore, you are expected to participate in two trading simulation projects and to do a group presentation of your trading ideas to the class.

COURSE OUTLINE

UNIT I: AN OVERVIEW OF TRADING AND MARKETS

(1.) Aug 25, Introduction
- Hasbrouck, Chapters 1 and 2
- Live Exercise: National Best Bid and Offer (NBBO)
- Resources: F335 Class 01 Introduction.ppt, National Best Bid and Offer.xlsx (or print the PDF file)

(2.) Aug 27, Overview
- Johnson, Sections 1.1-1.3, 1.6-1.8
- Live Exercise: 7EX Trading Simulation – bring your laptop to class!
- Resources: F335 Class 02 Overview.ppt, 7EXv04.xlsm

(3.) Sept 1, Market Microstructure
- Johnson, Chapter 2
- Resources: F335 Class 03 Market Microstructure.ppt

(4.) Sept 3, World Markets
- Johnson, Chapter 3
- Live Exercise: More 7EX Trading Simulation – bring your laptop to class!
- Resources: F335 Class 04 World Markets.ppt

UNIT II: ALGORITHMIC TRADING AND DMA STRATEGIES

(5.) Sept 8, Orders
- TAQ Project Explanation
- Johnson, Sections 4.1-4.4
- Resources: F335 Class 05 Orders.ppt, F335 TAQ Project.pdf, Cummins TAQ.xlsx, Google TAQ.xlsx, Lilly TAQ.xlsx

(6.) Sept 10, LOB and Call Markets
- TAQ Project Discussion
- Live Exercise: LOB and Call Markets
- Resources: F335 Class 06 LOB and Call Markets.ppt, LOB and Call Markets.xlsx (or print the PDF file)

(7.) Sept 15, Algorithmic Trading Simulation
- Kickoff of Algorithmic Trader Simulation – bring your laptop to class!
- Group organization
- Resources: F335 Class 08 Algorithmic Trading Simulation.ppt, F335 Fall 2014 Algorithmic Trader Simulation Instructions.pdf, Algorithmic Trader Simulation Fall 2014.xlsm

(8.) Sept 17, Algorithm Overview
- Johnson, Sections 5.1-5.2, 5.4-5.6
- Resources: F335 Class 07 Algorithm Overview.ppt

(9.) Sept 22, Transaction Costs

- Johnson, Chapter 6
- Live Exercise: Transaction Cost Measures
- Resources: F335 Class 09 Transaction Costs.ppt, Transaction Cost Measures.xlsx (or print the PDF file)

UNIT III: IMPLEMENTING TRADING STRATEGIES

(10.) Sept 24,

- Algorithmic Trader Simulation Competition – bring your laptop to class!

(11.) Sept 29, Algorithmic Dealer Simulation and Order Placement

- Kickoff of Algorithmic Dealer Simulation – bring your laptop to class!
- Johnson, Sections 8.1-8.2
- Group organization
- Resources: F335 Class 18 Algorithmic Dealer Simulation and Short Selling.ppt, F335 Class 11 Order Placement.ppt, Algorithmic Dealer Simulation Fall 2014 Instructions.pdf, Algorithmic Dealer Simulation Fall 2014.xlsm

(12.) Oct 1, Optimal Trading Strategies

- Live Exercise: Implementation Shortfall Components
- Johnson, Sections 7.1-7.5
- Resources: F335 Class 10 Optimal Trading Strategies.ppt, Implementation Shortfall Components.xlsx (or print the PDF file)

UNIT IV: THE SELL SIDE'S VIEW

(13.) Oct 6, Market Manipulation and Insider Trading

- Video Clips: *Next: The Future Just Happened*
- Discussion of *Next: The Future Just Happened*
- Lebed Posting
- Harris, pages 584-597
- Bhattacharya, Daouk, Jorgenson, and Kehr, pages 69-70,73-74, 82-83, 93
- Bhattacharya and Daouk, pages 75, 80-84, 89, 92-93
- Resources: F335 Class 15 Market Manipulation and Insider Trading.ppt

(14.) Oct 8

- Algorithmic Dealer Simulation Competition – bring your laptop to class!

UNIT V: CONCERNS ABOUT SECURITY TRADING

(15.) Oct 13, High-frequency Trading

- Video Clip: *Flash Boys*
- Discussion: *Flash Boys*
- Holden, Jacobsen, and Subrahmanyam, pages 40-49
- Resources: F335 Class 23 High-frequency Trading.ppt

(16.) Oct 15, Final Exam

READINGS

- *Algorithmic Trading & DMA*: *An Introduction to direct access trading strategies*, by Barry Johnson, published by 4Myeloma Press, only available at Amazon.com
- *Security Trading: Procedures and Principles*, *Draft Teaching Notes*, by Joel Hasbrouck, download from OnCourse
- A readings collection, download from OnCourse

GRADING

Grading is done on a relative (not absolute) basis. Following standard finance department policy, the average GPA will fall between 2.70 and 3.00. A detailed break-down of points earned-to-date will be posted on the PostEm tab of OnCourse on two occasions: (1) when the midterm is returned (including a indicative grade for the first half of the course) and (2) shortly after the last class session, which will be prior to finals week. The course grade is based on:

Item	Points	Percent	Kick Off	Due Date
Class participation	60 points	16.7%	----	----
Clicker Participation	60 points	16.7%	----	----
Algorithmic Trader Simulation				
• Algo. Trader Sim. Competition	30 points	8.3%	Sept 15	Sept 24
• Algo. Trader Sim. Written Report	30 points	8.3%		
Algorithmic Dealer Simulation				
• Algo. Dealer Sim. Competition	30 points	8.3%	Sept 29	Oct 8
• Algo. Dealer Sim. Written Report	30 points	8.3%		
Final Exam	120 points	33.3%	----	Oct 15
Total Points	360 points	100%	----	----

POLICIES

1. In the first two class sessions we will be evolving towards permanent seats with due consideration for the usual course adds and drops. In class 3, I will ask you to sign-up for a permanent seat for the rest of the semester. Permanent seats assist me in associating faces and names.

2. At the end of each team project, I will ask for confidential peer evaluations of individual contributions to the team output. Individuals who have contributed significantly less than their teammates will be penalized. The purpose of the peer evaluations is to provide direct incentives for individual contributions to the team output.

3. Students are expected to be ready for class at the scheduled time. Classes will start class on time and late arrivals will be frowned on.

4. Video cameras may be used to monitor the room during student assessment activities, including but not limited to, exams, tests, and quizzes. Video recordings may be used to investigate or support disciplinary action. All access to and use of video equipment and recordings will follow applicable IU policies.

GROUP PROJECTS

ALGORITHMIC TRADER SIMULATION

Students will be organized into teams and each team will download the Algorithmic Trader Simulation, which runs on the Excel simulation add-in program @RISK. Teams can analyze a variety of security trading problems. Each problem requests that a certain number of shares be purchased within a particular timeframe. In implementing this request, the general goal is to minimize the utility cost of trading = total cost of trading on shares purchased + (penalty coefficient) * (shares not purchased within the timeframe). Teams will use their own intuition to search for an *optimal* algorithmic order submission strategy (order type, size, and price, pattern over time, etc.) for each problem. Security trading problems can vary based on security trader type, degree of trader patience, magnitude of trader penalty cost for execution failure, performance metric, and stock that is being traded. Each team's order submission strategies will be put to the test in a live, head-to-head, security trading competition and each team will summarize their security trader strategies in a written report.

ALGORITHMIC DEALER SIMULATION

Students will be organized into teams and each team will download the Algorithmic Dealer Simulation, which runs on the Excel simulation add-in program @RISK. Teams can analyze a variety of dealer problems in a pure dealer market (similar to (pre-reform) NASDAQ or the London Stock Exchange). Teams will manage the strategy of one dealer in competition with other dealers. The overall goal is to maximize profits and control inventory risk. Teams will search for an *optimal* algorithmic dealer strategy (quote prices and depths, execute large orders in full or partial, adjust to order arrival patterns, adjust to information arrival, and manage inventory) for each problem. Dealer problems can vary based on dealer risk aversion, order processing costs, volume, stock, and overnight volatility. Each team's dealer strategies will be put to the test in a live, head-to-head, dealer competition and each team will summarize their dealer strategies in a written report.