

Instructor	Professor Vasant Dhar , Information Systems
Classroom	3-90 KMC
Class times	Tuesdays 6-9pm
Exam date/time	
Office Hours	Preferred communication: Email and telephone; 4-6PM Thursday and by appointment KMC Room 8-97
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1. COURSE SYNOPSIS

As financial markets become more electronic and more liquid, a higher degree of knowledge about systems and analytics is required in order to compete. This course teaches students how modern financial markets function as a network of systems and information flows, and how to use the information emanating from the markets for decision making and building and implementing systematic computer-based models for trading.

The financial industry as we know it today wouldn't exist high powered information systems. These systems make markets possible through electronic intermediation and supporting services such as data and analytical support, payment, settlement, authentication and representation. They are also becoming used increasingly to support or make decisions about taking or controlling some sort of risk – financial, operational, and regulatory.

The course begins with a description of the financial markets, specifically, equity, currency, fixed income, and commodities, and the systems that enable them. We consider exchanges, ECNs, and other dealer markets and the information that emanates from them. This provides the backdrop for the bulk of the course which covers the design, evaluation and execution of trading strategies that are commonly used by professionals in the various markets. There is increasing interest in particular, on *systematic* trading strategies and execution systems because of their scalability and transparency.

The course strikes a balance between theory and practice by grounding the discussion in the current state of financial markets. Senior portfolio managers from industry are invited to class periodically, and students are encouraged to make the most of these visits. The course requires students to do several hands-on exercises with real market data. The exercises start with a review of simple concepts of risk and return and progress to simple trading strategies that students build and evaluate. The objective is to help you understand how to assess markets in an orderly and scientific way so as to be able to draw sound inferences from the analysis.

The course should be of interest to students across the financial services industry. It will not transform you into a trading expert, which takes considerable effort, time, and pain. It will, however, bring the concepts of risk and return alive by working with real data and exercises, and through industry experts describing their approach to fund management and administration. More generally, the course should give you a clearer appreciation on the fact that understanding markets is a theory building exercise, where professionals spend a lot of time in understanding subtle market phenomena with the objective of translating their insights into profitable strategies. These concepts are useful regardless of your interest in the financial industry.

Self learning is an important part of this course. You will get the best value from this course if you experiment actively with ideas and construct trading strategies. There's nothing like learning by doing. Accordingly, 50% of the grade is assigned to your project. So, start early. Exploratory work always takes longer than you think.

2. TEXTBOOK AND MATERIALS

There are three types of materials used in the course: the main textbook, current readings, and data. The textbook for the course is:

An Encyclopedia of Trading Strategies, by Jeffrey Owen Katz and Donna McCormick, McGraw-Hill, 2000.

Because of the currency and richness of the topics, it is very difficult to find a single textbook that is simultaneously rigorous and practical. The above textbook is the best available for our purposes, but it is biased towards practice at the expense of theory. It doesn't provide any fundamental intuition about markets, nor is it mathematically rigorous. It is most useful in helping you think about measurement issues with time series data, commonly used types of indicators to describe states of markets, and vanilla models from which portfolio managers build more elaborate strategies. Indeed, one of your challenges is to try and relate the relationships in data that you're observing to plausible reasons, economic or psychological.

The textbook is supplemented with several useful articles:

1. Institutional Equity Trading in America 2005
2. Life at Sharpe's End
3. Have Hedge Funds Eroded Market Opportunities?
4. BOC: Portfolio Theory Primer
5. Reconciling the Structural Forces on the Dollar
6. DB Report on FX Trading
7. Interview with William Eckhardt, from The New Market Wizards

Since one of the main objectives of the course is to provide you with hands-on skills in developing and understanding trading strategies, **several datasets are provided:**

1. NYSE Specialist Buying and Selling Trading Volumes Weekly
2. Daily S&P500 cash data 1960-2005
3. Daily data for selected currency, fixed income, and equity futures
4. Fundamentals (Trade Balance) data for currencies (aligned with the dollar index)
5. Fundamentals-based aggregated equities data
6. A few month segment of minute level data for S&P500 index futures (for volatility modeling)

All materials (except for late breaking articles and non-electronic information) are posted on the class website. Students are also encouraged to explore the Internet for materials relevant to the course.

3. REQUIREMENTS AND EVALUATION

Since this is a hands-on course, there are several small assignments involving data analysis. You must have reasonable Excel skills to do these assignments. There are six such assignments. You must also participate in class discussion and come prepared to present your analyses to the class. Each class where an assignment is due will begin with several students at random being chosen to present their results.

In addition, you must hand in a term paper describing a complete trading strategy. It is preferable if this strategy is demonstrated using data and analysis, but conceptual analyses are also acceptable. Examples of things you could explore are:

- What is the relationship between volatility on different time scales (i.e. minutes versus days) and why could knowing this relationship be useful?

- Is there any relationship between current volatility and future returns in equity, bond, and currency or commodity markets?
- Which macroeconomic indicators have exhibited a consistent influence on which markets and what could explain this?
- Under what conditions would you expect an automated trader to outperform a human and why?
- Design and evaluate a fundamentals or technicals based trading strategy to trade indices, individual stocks, ETFs, etc.
- What will the electronic trading marketplace look like in 5 years and why? What are the implications of this structure for individual and institutional investors?
- Engineer a system where you can describe the market conditions under which it would make and lose money. How would you position such a system for investors?

The first type of project would require some programming and the ability to deal with a large amount of data. The second and third can be handled within Excel. The fourth is conceptual, requiring a position and data/theory to support it.

There is no final exam. The grade breakdown is as follows.

1. Assignments: 50 points

2. Term paper on a trading strategy plus class participation: 50 points

The assignments will address the following types of questions:

1. Do NYSE specialists add value? Does their behavior express any expectation about the future?
2. How do you compare alternative strategies: what does the “control panel” look like?
3. Has there been any correlation historically between equity market volatility and direction?
4. What Moving Average Crossover models have worked historically in equity, currency, and fixed income markets? How do you compare models? What Breakout models have worked historically in these markets?
5. Is there any relationship between Trade Balance and dollar movement?
6. Is there any predictability in Q1-Q5 based on BARRA factors?
7. Is there any persistence in high frequency volatility?

4. TIMETABLE (Feb 07 to May 02 2005): Subject to Revision

Date	Topic	Readings	
	Intro (Course Overview and Objectives, Information Systems in Exchanges and Dealer Markets)	None	Assignment 1 handout
	Equity Markets, Systems, and Algorithmic Trading	Institutional Equity Trading in America 2005	
	Basic measurement: performance, risk, volatility, trend, impact, clustering	Barra on Campus (BOC) Chapter 1: pp. 1-15 Life at Sharpe's End Chapter 7	Ass1 due; Ass2 handout
	Momentum trading: How and When Moving Average and Breakout Models Work	Part II: The Study of Entries Chapter 5: Breakout Models Chapter 6: Moving Average Models	Ass2 due; Ass3 handout
	Optimization, Nonlinearities and Robustness Issues in High Dimensional Spaces	Chapter 3	Ass3 due; Ass4 handout
BREAK			
	Fundamentals-based equity strategies	BOC Chapter 1: pp. 16-28	Ass4 due; Ass5 handout
	High Frequency trading	TBD	Ass5 due; Ass6 handout
	Currency trading strategies: fundamentals and technicals	DB Research Report: Reconciling the Structural Forces on the Dollar DB Handout on FX trading	Ass7 handout
	Genetic Algorithms and Optimization	Chapter 12	
	Human Intelligence: News-Based trading	TBD	Ass7 due
	Artificial Intelligence: Neural Networks, Pattern Recognition, and Rule Discovery	Chapter 11 Dhar et.al article	
	View from the investor and manager of portfolio managers: middle and back office issues and transparency Recap of the future of trading: computers or humans?	None	Final project due