1. COURSE SYNOPSIS

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

The course covers the basis, evaluation and execution of trading strategies that are commonly used by professionals in financial markets. There is increasing interest in particular, on systematic trading strategies and execution systems because of their consistency in decision making, their transparency, and scalability. The central objective of this course is to understand the essence of systematic trading, key elements of which are the basis for generation of “alpha,” and how to think about and control the various types of risks associated with systematic trading systems.

2. Learning Goals

There are two main learning goals and a secondary one associated with this course:

1. Critical and Integrative Thinking: specifically, how do you transform a trading idea into a concrete description that can be described and modeling using a spreadsheet. The spreadsheets from the various assignments are usable as “templates” for developing more advanced strategies. In addition to translating an idea into a model, students will learn how to draw and assess conclusions from the model and data provided.

2. Effective Oral Communication: Each student shall be able to communicate verbally in an organized, clear, and persuasive manner, and be a responsive listener.

3. Interpersonal Awareness and Working in Teams: Students will submit a project which may entail working in a small group and must apportion tasks appropriately and submit a quality product in a timely manner.

The course strikes a balance between theory and practice by grounding the discussion in the current state of financial markets. The course requires students to do several hands-on exercises with real market data in Excel. The exercises start with a review of simple concepts of risk and return and progress to
realistic 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, experience, 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 emerging market phenomena with the objective of translating their insights into profitable strategies. These concepts are useful regardless of your specific interest in the financial industry, i.e. whether you intend to be a trader, risk manager, controller, salesperson, or analyst.

Self learning is a particularly important part of this course. You will get the best value from this course if you experiment actively with ideas and actively construct and test trading strategies instead of just coming to class and expecting to be told what works and what doesn’t. 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. Indeed, your very first assignment is to write a 1-2 page summary of what you might do as your project. Even if you end up changing topics, the exercise will help you get started in thinking about it seriously, before you get into the nitty-gritty of the quantitative exercises.

3. Course Materials

There is no required textbook for this course. However, the following, relatively recent book, describes at a high level the basis for quantitative trading strategies:

Inside the Glass Box: The Simple Truth About Quantitative Trading, Rishi Narang, 2009

For those students wanting details on market indicators and measurement, a useful textbook is:

New Trading Systems and Methods, Perry Kaufman, Wiley 2005

The above textbook is biased towards practice at the expense of theory and it has detailed descriptions of market indicators and methods, which makes it a good reference. It is not mathematically rigorous, but 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.

A set of current readings will be posted on Blackboard. In addition to these readings, the course will provide datasets that will be used for the assignments. The assignments are simple, and intended to serve as a foundation for thinking about more sophisticated trading strategies you might build going forward. In order to keep the material accessible, all examples are illustrated in Excel.

The articles used in the course include (but are not limited to) the following:

1. Life at Sharpe’s End: covers performance measurement, especially the Sharpe Ratio and its imitations
2. BARRA on Campus: provides a general overview of risk and its measurement
3. Reconciling the Structural Forces on the Dollar, DB Research Report: provides a macroeconomic basis for trading currencies
4. DB Guide to FX Trading: provides the various approaches to currency trading strategies at various time frames
5. Interview with William Eckhardt, from The New Market Wizards: talks about the statistical assumptions about market behavior that underlie trading strategies, the validity of these assumptions, and the implications when they don’t hold
6. Article on high frequency trading
7. Articles summarizing news-based trading approaches

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 including the following:

2. Daily data for selected currency, fixed income, equity futures, and commodity futures
3. Fundamentals (Trade Balance) data for currencies (aligned with the dollar index)
4. Fundamentals-based aggregated equities data
5. Equities data for spread-based (pairs) trading

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 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 up to 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:

- 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?
- Which types of strategies would you expect to perform well in emerging markets such as India, based on experiences in the more mature markets in the US and Western Europe?
- 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 (such as the “DOJI”) 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?
- In which markets is high frequency trading worthwhile and why?

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

- **Assignments:** 50 points
- **Term paper on a trading strategy:** 40 points
- **Class participation and attendance:** 10 points
4. TIMETABLE (Feb 12 to May 07 2011):
(Subject to slight revisions)

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
<th>Readings (posted on BB)</th>
<th>Submission/Handout</th>
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</thead>
<tbody>
<tr>
<td>Feb 12</td>
<td>Introduction and Course Objectives</td>
<td>None</td>
<td>Assignment 0 dataset handed out</td>
</tr>
<tr>
<td>Feb 19</td>
<td>Markets and basic measurements of performance, direction and volatility</td>
<td>Life at Sharpe’s End</td>
<td>Assignment 0 due BRING LAPTOPS TO CLASS for In Class Exercise</td>
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<td></td>
<td>How to compare strategies Assignment 1 handed out</td>
<td></td>
<td>Assignment 1 handed out</td>
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<tr>
<td>Feb 26</td>
<td>Technical trading: Trend Following Systems &amp; Futures Markets</td>
<td>Reading: Kauffman Chapter 8 Time-Based Trend Following Systems</td>
<td>Assignment 1 due 6pm Assignment 2 handed out</td>
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<tr>
<td>Mar 5</td>
<td>Technical trading: Trend and Counter-trend systems Assignment 3 handed out</td>
<td>Reading: website link</td>
<td>Assignment 2 Due 6pm Assignment 3 handed out</td>
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<tr>
<td>Mar 12</td>
<td>Technical trading: Spreads and pairs trading in Equities Markets Assignment 4 handed out</td>
<td>Kauffman Chap13: Spreads and Arbitrage; Dickey-Fuller test handout</td>
<td>Assignment 3 due 6pm Assignment 4 handed out</td>
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<td></td>
<td>MIDTERM BREAK</td>
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<td>Mar 26</td>
<td>Pairs trading review; Fundamentals and currency trading strategies</td>
<td>Readings: Battle of the Dollar; FX Guide</td>
<td>Assignment 5 handed out</td>
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<tr>
<td>Apr 2</td>
<td>INDUSTRY PERSPECTIVE: Guest speaker</td>
<td>TBD</td>
<td>Assignment 4 due 6pm</td>
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<td>Apr 9</td>
<td>Currencies and carry trades; Cointegration and basket trading</td>
<td>FX Guide</td>
<td>Assignment 5 due 6pm Assignment 6 handed out</td>
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<td>Apr 16</td>
<td>News-based Trading Systems</td>
<td>Chap14: “News” from Algorithmic Trading and DMA</td>
<td>Assignment 5 due 6pm</td>
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<td>Apr 23</td>
<td>INDUSTRY PERSPECTIVE: Guest speaker</td>
<td>TBD</td>
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<tr>
<td>Apr 30</td>
<td>High frequency trading</td>
<td>Chap15: “Day Trading” from Algorithmic Trading and DMA</td>
<td>Assignment 6 due 6pm</td>
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<td>May 7</td>
<td>Recap and Summary Selected Student Project Presentations</td>
<td>N/A</td>
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