Instructor: Raja Velu, Ph.D.  
(rvelu@stanford.edu; rpvelu@syr.edu)  
Class Hour: 11:00am-12:15pm MW  
Room: Gates B3  
Office: Sequoia Hall  
Office Hours: By appointment only  

Teaching Assistants:  
1. Abhay Subramanian  
   Office Hour: TBA  
2. Yuming Kuang  
   Office Hour: TBA  

Course Description: This course is an introduction to financial trading strategies based on methods of statistical arbitrage. Topics include methodologies related to high frequency data, momentum strategies, pairs trading, technical analysis, models of order book dynamics and multi-exchange order placement and routing and dynamic trade planning with feedback. Emphasis is on developing, automating and empirically evaluating the models that reflect the market and behavioral patterns. The course will be balanced between theory and practice with a sufficient theory to understand practical applications. Although the methodologies could be applied to various financial markets, the course will mostly focus on stock and equity markets.

Prerequisites: Stats 240 or equivalent.

Optional Texts:

Additional research articles are listed at the end; selected papers will be posted on the course site.

Grades: Grades will be based on the following: Assignments (120) and a Final Project (80), with a Total of 200 points.
Homework: There will be three assignments, each consisting of several problems. These assignments will be done individually or in a team of two. Each member of the team should do all the assigned problems and then meet as a group to decide on what to submit. The computer output should be submitted in a standard format and should be clearly annotated. Late assignments will NOT be accepted.

Computer Software: We will use R, which is available for free download (http://www.cran.r-project.org/).

Project: You must complete a class project on a team or an individual basis. You should submit a written report on a project of the team’s choosing by Wednesday, August 14, 2013. The report should not exceed ten pages and should be in a formal presentable to a senior finance manager in a quantitative research group. An initial one-page proposal indicating the research questions and the sources of data must be approved by Monday, July 29, 2013.

Tentative Schedule:

<table>
<thead>
<tr>
<th>Day/Week Of</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1</td>
<td>Course Overview</td>
<td>ABFLR, Ch. 1</td>
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<tr>
<td>July 3</td>
<td>Stylized Facts of Asset Returns</td>
<td>LX, Ch. 6</td>
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<td>July 8</td>
<td>CAPM, Cointegration Review</td>
<td>LX, Ch. 3 &amp; 9</td>
</tr>
<tr>
<td>July 10, 15, 17</td>
<td>Trading Algorithms</td>
<td>LX, Ch. 11 &amp; AS, Select Chapters</td>
</tr>
<tr>
<td>July 22</td>
<td>Speaker: Daniel Nehren, J.P. Morgan Chase</td>
<td>ABFLR - Part III, Ch. 5</td>
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<td>July 24, 29</td>
<td>Trading Mechanics,</td>
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<td>Order Book Dynamics,</td>
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<td>Execution Algorithms</td>
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<tr>
<td>July 31</td>
<td>Market Impact Models</td>
<td>ABFLR - Part III, Ch. 5</td>
</tr>
<tr>
<td>Aug 5, 7</td>
<td>Portfolio Rebalancing,</td>
<td>ABFLR - Part IV</td>
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<td>Multi-Asset Trading</td>
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Additional four lectures will be scheduled during this period. Exact dates will be announced later.

Tentative Reading List [Key papers are marked with (*)]

A. Stylized Facts: An Overview


B. Market Micro Structure


C. Algo Trading / Order Book Dynamics


D. Trading Strategies

D.1.: Technical Analysis


D.2: Momentum


D.3: Statistical Arbitrage


D.4: Pairs Trading


D.5: Others


E. Execution Strategies


F. Market Impact Models


G. Portfolio Approach to Trading

H. Others


I. New Papers


