

ALGORITHMIC TRADING COURSE MODULE 2 BACKTESTING & QUANTITATIVE TRADING

13 – 15 April 2012 (3rd Intake)

0930 hrs – 1715 hrs

Nanyang Technological University

- ❖ **3-day course**
- ❖ **Learn how to carry out rigorous quantitative analysis of a trading strategy**
- ❖ **Receive a complimentary copy of Dr Ernest Chan's "Quantitative Trading: How to Build Your Own Algorithmic Trading Business"**

- ❖ **Class size is capped**
- ❖ **50% funding from Financial Training Scheme grants (based on MAS qualifying criteria)**
- ❖ **SGX Trading Representatives who complete this course are eligible for one Continuing Education Programme (CEP) credit**

Technology Partner



Introduction

Algorithmic trading often involves the use of mathematical models to describe and predict market movements. These models are then implemented on computer systems for automatic execution. The job of an algorithmic trader is to first develop a market intuition or idea of how prices should evolve. Using mathematics, the trader then turns the idea into a quantitative model for analysis, back testing and refinement. When this quantitative model proves likely to be profitable after rigorous statistical testing, the trader implements the strategy on computer systems for execution.

This is a 3-day intensive course designed to provide participants with a good understanding of the core concepts and quantitative techniques used in the backtesting and optimization of a trading strategy with particular emphasis on pair trading and related strategies. Participants will use MATLAB software to solve backtesting problems using real market data.

Outcome

At the end of the course, participants are expected to develop:

- an understanding of the core concepts in quantitative trading
- a deep appreciation of the process of using mathematics and statistics to analyze the profitability of a trading model
- "hands on" experience of how backtesting is done
- an understanding of pair trading in stocks, ETFs, futures and currencies

Highly Recommended for

- Traders wishing to apply their mathematical and statistical strengths in the trading arena
- Algorithmic traders seeking a deeper appreciation of the role of quantitative traders
- Regulators, risk managers and auditors who need a good understanding of the nature of quantitative analysis
- Anyone who aspires to become a quantitative trader

Preferred Background

- Some experience in trading is preferred but not essential
- Some basic statistics background
- Some programming experience is preferred

Contents

Topic 1: Introduction to backtesting

- What is backtesting?
- The importance of backtesting
- The limitations of backtesting: a survey of common pitfalls
- How to decide whether to backtest a strategy: a series of examples
- Criteria for choosing a backtesting platform: pros and cons of various platforms

Topic 2: MATLAB tutorial

- Why is MATLAB superior to Excel/VBA/Java/C++/C# for portfolio trading research? Overview of capabilities as research and backtesting platform
- The pros and cons of using MATLAB as automated trading platform
- Quick survey of syntax

Topic 3: Nuts and bolts of backtesting

- Backtesting a single instrument
- Performance measurement: common metrics
- Transaction costs: discussion of various sources of transactions costs
- Choosing a historical database: important pitfalls to avoid
- Backtesting a portfolio
- Strategy refinement
- Ways to avoid look-ahead and data snooping biases
- Why is live trading performance usually worse than backtest performance?

Topic 4: Kelly formula

- Risk management using Kelly
- Capital allocation using Kelly

Topic 5: Theoretical foundation of pair trading

- Concept of stationarity, and why it is useful
- Concept of cointegration, and why it is useful
- How is cointegration different from correlation?
- How are stationarity and cointegration different from mean-reversion?
- Test for mean-reversion: computing half-life based on Ornstein-Uhlenbeck formula
- Why is computing half-life better than computing average holding period?

Topic 6: Trading applications of stationarity

- Statistical test for stationarity: ADF

Topic 7: Cointegration and pair trading

- Statistical tests for cointegration: CADF and Johansen
- Finding the best hedge ratio
- Backtest vs. cointegration
- Past \neq Future
- Parameterless pair trading
- Stop loss?
- Trading cointegrated triplets
- What are the best markets to pair-trade? Pros and cons of each market
- Automated pair trading

Topic 8: Related strategies

- Index arbitrage: Trading an index against a basket of its component stocks
- Statistical arbitrage
- Momentum vs. mean-reversal
- Momentum pair trading: examples
- Other stock mean-reversion trades

Trainer

Dr. Ernest P. CHAN Industry Fellow, NTU-SGX Centre for Financial Education

Dr. Ernest P. Chan's career since 1994 has been focusing on the development of statistical models and advanced computer algorithms to find patterns and trends in large quantities of data. He has applied his expertise in statistical pattern recognition to projects ranging from textual retrieval at IBM Research, mining customer relationship data at Morgan Stanley, and statistical arbitrage trading strategy research at Credit Suisse First Boston, Mapleridge Capital Management, Millennium Partners, and MANE Fund Management.

While in the Human Language Technologies group at IBM T. J. Watson Research Center (Yorktown Heights, NY), Ernest spearheaded IBM's research effort to develop a system for searching large text databases such as the World Wide Web, catapulting IBM's reputation as a top player in the field. His system was placed seventh among some forty competitors in a competition sponsored by the National Institute of Science and Technology and the Department of Defense in 1996. At the Data Mining group in Morgan Stanley's headquarter in New York, Ernest pioneered the application of some of these sophisticated statistical algorithms to the complex task of extracting customer relationships in the Morgan Stanley customer accounts database.

Ernest was invited to join a proprietary trading group at Credit Suisse First Boston in New York in 1998 to develop statistical models for futures trading, stock pair-trading as well as trading based on earnings revisions, surprises and analyst recommendation changes. He joined Mapleridge Capital Management Corp. in 2002 as a Senior Quantitative Analyst working on futures trading strategies, and then Maple Securities/MANE Fund Management Inc. in 2003 as a senior researcher and trader.

Ernest consults for money management companies and also manages various accounts including EXP Quantitative Fund, L.P. which he co-founded. He has served as an expert witness in a matter related to algorithmic trading. He writes the Quantitative Trading blog which is syndicated to www.tradingmarkets.com and Yahoo Finance, and has published in the Automated Trader magazine. He was quoted by the New York Times and CIO Magazine, and interviewed on CNBC's Closing Bell program and Technical Analysis of Stocks and Commodities magazine on topics related to quantitative trading. He is the author of "Quantitative Trading: How to Build Your Own Algorithmic Trading Business" published by John Wiley & Sons in 2008.

Ernest holds a Bachelor of Science degree from University of Toronto in 1988, graduating with High Distinction and receiving the Lieutenant Governor's Gold Medal. He also holds a Master of Science (1991) and a Doctor of Philosophy (1994) degree in theoretical physics from Cornell University. In recognition of his expertise in statistical data mining, he was invited to serve on the Program Committees of the International Conference of Knowledge Discovery and Data Mining in 1998 and also of the SPIE Conference on Data Mining and Knowledge Discovery in 1999. He was an invited panelist on Effective Arbitrage Strategies at the ETF Evolution 2007 Summit. He was an invited speaker at the Automated Trading conference in London, UK, in October 2009. He conducts workshops on topics from Pair Trading to Backtesting in New York, London and Hong Kong.

Venue

Nanyang Technological University
NTU-SGX Financial Trading Lab
Block S4, Level B1, Section B, Unit 14/16, Nanyang Avenue, Singapore 639798

Fees and Registration

Seminar Session - Past Participants of NSCFE Courses & Early Bird Discount (*payment made before 2 Mar 2012*)

SGX Member - SGD3,380 (excluding 7% GST) before funding support from FTS grants¹
Non-SGX member - SGD3,780 (excluding 7% GST) before funding support from FTS grants¹

Seminar Session - Program Fees

SGX Member - SGD3,830 (excluding 7% GST) before funding support from FTS grants¹
Non-SGX member - SGD4,230 (excluding 7% GST) before funding support from FTS grants¹

* 7 % GST is not applicable for overseas companies sponsoring their employees.

* Fees include lunches, tea breaks, course materials and the use of an individual hands-on trading terminal.

* For overseas participants, on-campus accommodation is available at Nanyang Executive Centre, NTU. Please log on to www.ntu.edu.sg/nec to find out more.

¹ The Monetary Authority of Singapore (MAS) administers Financial Training Scheme (FTS) grants to financial sector organisations that sponsor eligible Singapore based participants to training programmes that meet the qualifying criteria. For more details, please visit www.mas.gov.sg, or contact the MAS at 6229-9396 or fsdf@mas.gov.sg.

To Register:

- Log on to www.ntusgxcfe.ntu.edu.sg/coursesregistration.asp to register
- Closing date for all registrations is 16 Mar 2012
- All payments must be received by 30 Mar 2012

For Enquiries:

Please contact Ms Ahneesah Omar or Ms Michelle Chah at Tel: 6790 6078 / 5736 or email nscfe@ntu.edu.sg