

Course: FI 498TS

Title: Quantitative Methods For Technical Trading Systems



CyberCampus – Summer 2015

Name of Instructor: Tom McAlone

Instructor Title: Adjunct Professor

Name of School: Ageno School of Business

GOLDEN GATE UNIVERSITY

Contact Information

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Important Dates:

First Day of class: May 3, 2015

Last Day of class: August 15, 2015

1. Course Description

From the GGU Course catalog:

Provides advanced studies into the building, optimization, validation and monitoring of on-going trading system stability using trading/charting software, Excel statistical calculations and Monte Carlo simulations. Several types of trading and active investing systems based on technical analysis will be covered. Topics will include descriptive statistics, custom objective functions, walk forward optimization, risk management, position sizing, and portfolio analysis.

Course Philosophy:

The outcomes from a trading or active investing system are a combination of luck and skill. Given the relatively large variances and small returns that characterize financial asset returns, it is often hard to untangle the luck from skill. In this class we will set up our backtesting through on-going system stability check process with this relationship in clear focus. The end goal is to embed enough skill from technical analysis tools into the system so that the outcomes exhibit acceptable return/risk ratios and statistical skill signatures in out of sample data to provide the users with increased confidence as they look towards implementation. Additionally, we will provide a wide set of examples through in-class examples and student presentations to reach as many trading styles as possible.

2. Course Objectives

Students will learn, practice and demonstrate competency in the following areas :

- Building, optimizing and validating a trading or active investing system.
- Selecting the most appropriate approaches from alternatives such as trend following, mean reversion, and intraday systems to meet their goals.

- Performing statistical tests using Excel and Monte Carlo on both in sample and out of sample data as well as monitoring on-going trading or active investing system health.
- Separating luck from skill during their system development using statistical tools to identify acceptable return/risk ratios and skill signatures.
- Apply all the learning outlined above to their individual trading or active investing systems to evaluate confidently moving from system development to real time trading.

3. Required Materials and Resources

- **Software** – Students should have access to a trading/charting system that can output a list of trades or returns. All statistics will be done in open-source R or Excel. Most examples of trading systems will be demonstrated using AmiBroker or TradeStation. Open-source R is an acceptable alternative. Students are eligible to obtain a free student copy of TradeStation through the TradeStation academic program. Students will be expected to have some basic scripting skills similar to those used for writing Excel macros or scans for StockCharts.com. The instructor will work with individual students to ensure that the interface is smooth and help troubleshoot coding issues in AmiBroker/TradeStation/open-source R language. Students can utilize the educational resources from the TradeStation website including their free video tutorials. The Easy Language Home Study Course (\$99) and/or Easy Language Boot Camp (\$249) are available for further study.
- **Books** – Howard Bandy's books outlined below will provide the foundation for the course as they represent the best combination of practical information and rigorous statistical methods for developing trading systems based on technical analysis.

Bandy, Howard, Quantitative Trading Systems, 2nd Edition, Blue Owl Press, 2011
ISBN-13: 978-097918383-6

Bandy, Howard, Modeling Trading System Performance, Blue Owl Press, 2011
ISBN-13: 978-097918382-9

Book Store: To purchase course books from eFollett, GGU's official online bookstore go to www.ggu.bkstr.com/.

- **Supplemental Papers/Articles** – A set of research papers/articles from business school professors will provide strong validation for the concepts used in this class and stretch the students. Examples include MIT's Andrew Lo (Head & Shoulders Pattern Detection/ Adaptive Market Hypothesis), Columbia's Michael Mauboussin (Skill & Luck) and Adelaide's Paskalis Glabadanidis (Moving Averages). While most of the statistical calculations in these papers are beyond the scope of this class, the summary/conclusions of these articles are important.

- **University Library - Resource**



There are databases available through the Golden Gate University Library for students to conduct research on various topics. Remote (off campus) access to the databases requires your last name and student ID# (located on the front of your ID card). Be sure to type in ALL 7 digits, including the starting 0. Example: 0123456. You may access the library from <http://www.ggu.edu>.

4. Contacting the instructor

Tom McAlone

Email: tom.mcalone@gmail.com

Phone: 510-757-7712

When to contact: Anytime. Please use e-mail for longer or more complex issues.

5. Course Requirements, Student Responsibilities, Evaluations

Course Requirements

In order to meet all the course objectives, students must be engaged and participate in each phase of the weekly class session. Some readings/videos will be designated as supplemental to allow students to deepen their knowledge of the subject at their own pace. Links and a bibliography will be provided for reference. The 1 on 1 sessions via GoToMeeting and code troubleshooting support should provide a solid foundation for completion of the final trading plan paper which will demonstrate the student's skill in using quantitative methods on technical trading systems.

Student Responsibilities

Student responsibilities are to do the required readings before viewing the video lectures, complete homework assignments in sequence, participate in a mandatory 1 on 1 GoToMeeting session with the instructor to review the work in progress trading plan progress and hand in the final trading plan paper. Students are expected to actively participate in the class by commenting in the bi-weekly discussion forums. Students are expected to have a working knowledge of the trading system software/Excel they are going to use to generate the positions and statistics required for their homework assignments and final trading plan presentation.

Evaluations

You will receive an opportunity to evaluate the course and instructor at least once this term.

6. Course Procedures

Each class session will begin with the required readings from the textbooks/articles that support that week's material, move to the lecture presentation including video lectures and audio slide presentations, followed with a discussion question for forum input every other week and optional supplemental readings when relevant. Homework assignments will be due about every other class for the first several sessions. The trading plan work in process reviews during week 13 will be the class mid-term. All code and spreadsheets used for in-class examples will be posted for student download, use and modification. The instructor is available to troubleshoot code from in-class examples as it relates to use in the student's trading plan project.

7. Grading Policy

Grading Policy	
Component 1	Trading Plan: Final Paper – 40%
Component 2	Oral Midterm/ Trading Plan Review – 20%
Component 3	Homework – 25%
Component 4	Discussion Forums – 15%

Grade	Skills
A	Contributions are prompt, timely, relevant, self-initiated; remarks are raised freely on all assignments throughout the course; there is no attempt to dominate conversation.
B	Student generally keeps up with the discussion. Needs some prompting to contribute.
C	Participation is spotty; picks and chooses topics to get involved. Demonstrates little initiative.
D	Some participation, makes relevant remarks
F	No participation

Late Assignments

Although this is an entirely online class, the homework assignments which will provide practice for the statistical calculations and trading system construction/analysis. Late work will be docked one letter grade unless previously cleared with the instructor. Also trading plan rule setup and test runs should be started early in the semester to ensure software is working properly.

GoToMeeting Sessions

As a supplement to the online materials, the instructor will schedule a voluntary office hour using GoToMeeting for students to discuss homework and other questions for the first 8 weeks. During week 13, the instructor will schedule a 1 on 1 session with each student to review progress on the trading plan as an oral midterm. The week 13 session will count as the required supervised (proctored) exam. Depending on complexity, code trouble shooting may also use GoToMeeting interactions.

8. Instructor Bio:

Tom McAlone is an active member of the Technical Securities Analysts Association of San Francisco (TSAASF). His focus is developing and implementing technical trading systems from an algorithmic and statistically based approach. Previously, he worked in purchasing management for Clorox and Dreyer's Grand Ice Cream for 30+ years managing spends of up to \$175 MM utilizing statistical forecasting techniques for food and industrial commodities. His guest lectures covering building, optimizing and validating trading systems in FI 358 here at Golden Gate University have evolved into this in depth treatment in FI 498TS. He holds both a Masters and Bachelors degree in mathematics from the University of California, Berkeley.

9. Tentative Course Outline

Session	Title	Topics
Session 1	Introduction	Technical Analysis Premises, Active Investing, Descriptive Statistics, and Skill versus Luck
Session 2	Process Overview	Define Components, Review Process Flow, Set Overall Goals & Metrics
Session 3	Building The System	Entries & Exits, Calibrating Goals, and present Example #1
Session 4	Backtesting	Begin our testing process and present Example #2
Session 5	Objective Functions/ Optimization	Review objective functions and present the training and testing phases.
Session 6	Tradables / Trends / Total Returns	Review underlying assets to ensure they are maximizing your chances for success
Session 7	Refining The System	Analyze the results to date and potential filters to improve performance.
Session 8	Monte Carlo Simulation	Utilize Monte Carlo simulation on monthly returns or trade sequences to model future variability
Session 9	Validation	Present the train/test/validate method
Session 10	Walk Forward Optimization	Present the walk forward optimization and validation methodology
Session 11	Position Sizing/Risk Management	Outline position sizing methods and risk management tools
Session 12	Monitoring System Health	Review statistical methods for monitoring on-going performance to confirm the model and data remain in synchronization.
Session 13	Trading Plan Presentations	1-1 sessions covering each student's trading plan work in progress.
Session 14	Portfolio Analysis #1	Introduction to portfolio analysis including rotational systems
Session 15	Portfolio Analysis #2	Combining technical trading models in a portfolio