

**ACTIVE PORTFOLIO MANAGEMENT
SPRING 2016
SYLLABUS**

1. GENERAL INFORMATION

2. GRADING

Your course grade will be the average of your homework grades and your final project grade.

3. HOMEWORK

Homework will be posted roughly every two weeks on Classes and solutions should be submitted to Classes on or before the due date.

You are free to discuss the homework problems among yourselves, but you must turn in your own work; students turning in substantially identical work will be penalized.

4. COURSE OUTLINE

- (1) Optimization
 - (a) Review of classical static analysis
 - (i) Markowitz Theory
 - (ii) Expected Utility
 - (iii) CAPM
 - (b) Is active management possible? Discussion of the Efficient Market Hypothesis
 - (c) Transaction cost models
 - (i) Components of transaction costs: bid-ask spread and market impact
 - (ii) Linear impact model
 - (iii) Grinold-Kahn model
 - (iv) Kyle model
 - (v) Empirical results: Bouchaud
 - (d) Dynamic trading strategies with transaction costs
 - (i) Almgren-Chriss approach
 - (ii) Incorporating return forecasts
 - (iii) Introduction to dynamic programming; digression on Hidden Markov Models
- (2) Estimation and forecasting of the return distribution
 - (a) Linear models
 - (i) OLS/GLS models
 - (ii) Factor models and APT

- (iii) Mixed-effects models
- (b) Machine Learning Techniques
 - (i) LASSO and other penalized regression methods
 - (ii) Random forests with applications
 - (iii) Gaussian processes with applications
 - (iv) Reinforcement Learning
 - (A) Basic techniques
 - (B) Q-learning
 - (C) Monte Carlo methods
 - (D) Function approximation
 - (E) Applications to microstructure trading and games of strategy
- (c) Advanced machine learning techniques, as time allows