

**November 30<sup>th</sup>, 2015**  
**KAP 414**  
**2:00 P.M. – 3:00 P.M.**

**Professor Leonard Wong**  
(University of Washington, Seattle)

**“Geometry and Optimization of Relative Arbitrage”**

**Abstract:** Consider investing in an equity market. While classical financial theory suggests that the market portfolio is efficient, stochastic portfolio theory shows that the market can be beaten under realistic conditions. Moreover, no forecasts of expected returns and covariance's are needed to construct such relative arbitrages. Suppose we restrict to portfolios that are deterministic functions of the market weights (firm size divided by total market value). Under the conditions of diversity and sufficient volatility, we characterize all portfolios leading to relative arbitrages in two ways: first, as Fernholz's functionally generated portfolios, and second, as solutions to an optimal transport problem. The later leads naturally to an optimization problem, and we will introduce another approach in the spirit of nonparametric density estimation and Cover's universal portfolio. This is joint work with Soumik Pal.