STAT 631 Course Outline

Asset Returns – prices and returns, random walks, the efficient market hypothesis
The efficient market hypothesis, empirical evidence Bond yields and prices
Exploratory Data Analysis – Distributional properties of return data, Stylized Facts of Financial Time Series
Modeling Univariate Distributions - Parametric models
Maximum likelihood estimation
AIC and BIC, profiled likelihood
Multivariate Statistical Models - Multivariate normal and *t* distributions, Elliptically contoured densities
The multivariate skewed distributions, the Fisher information matrix
Copulas - Definitions and families, rank correlation
tail dependence, rank correlations, calibrating copulas
Portfolio Selection - Combining 2 risky assets with a risk-free asset
Selling short, risk-efficient and portfolio with *N* risky assets
Portfolios with box constraints, utility
Risk Management - VaR (value at risk) and ES (expected shortfall)
Parametric, semi- and non-paramtric estimations of VaR and ES
The Capital Asset Pricing Models - The capital market and security lines, the CAPM formula
The security characteristic line and betas
Estimating beta and testing CAPM
Factor Models and Principal Components – Multifactor pricing models
Statistical factor models, Principal Components
approximate factor models
Time Series Models – Stationary processes, the ARMA models
Unit root tests, estimating ARMA models
Model selection, forecasting
GARCH Models – Conditional volatility and GARCH processes, estimating the GARCH models
Forecast with ARMA + GARCH models, rolling forecasts
The extended GARCH models, estimating VaR and ES using ARMA + GARCH models
Cointegration – The Engle and Granger procedure, the Johansen procedure and tests, error correction models