Course Description: This course will teach you a practical approach to modeling time series data. The goal of modeling is to explain and to predict: to account for why a phenomenon varies over time and to predict its future. The course focus is on empirical modeling, rather than theoretical properties. You will learn how to propose models, estimate them with data, diagnose whether they fit, and interpret their meanings. Models covered include random samples, random walks, regression, autoregression, moving averages, and related structures. Computer demonstrations with both real and simulated data will be used extensively.

Day 1:
Introduction to time series modeling
Examples of time series data
Objectives of modeling
   Explanation
   Forecasting
The random sample as the basic time series model
Estimating and forecasting a random sample
Finding random samples in real data
A general approach to modeling
   Actual = Fit + Residual
   Propose model
   Estimate model
   Verify model
   Use model
Why it matters to have a correct model
   Bias
   Margin of error
Computer software
   SAS and/or Excel

Day 2:
The random walk
   Definition
   Verification
   Forecasting
   Implications
Finding random walks in data
Autoregression
  - Definition
  - Verification
  - Forecasting
Durbin-Watson statistic
Autocorrelation function
Partial autocorrelation function
Finding autoregressions in data

Day 3:
Experiences with modeling real univariate time series
  - Trends
  - Seasons and cycles
  - Autocorrelation
  - Heteroscedasticity

Day 4:
Multivariate time series modeling
Other topics (as time permits)
  - Moving averages
  - ARIMA
  - Panel data