State Space Modeling of Sequence Data, ½ day

It is well known that (linear) state space models (SSMs) provide a unifying framework for a variety of time series models such as ARIMA models and unobserved component models (UCMs). In fact, SSMs are also applicable for the analysis of more general sequence data types such as panel of time series, and data collected at irregular time intervals (longitudinal data). The goal of this workshop is to showcase the richness of state space modeling framework by illustrating its usage in a few different applications. The workshop will cover the following topics:

- Brief introduction to linear state space models with partially diffuse initial condition. This includes a good discussion of (diffuse) Kalman filter and smoother algorithm (primarily its output), the main computational tool used in state space modeling.
- State space formulation of some key model classes such as ARIMA, UCM, Dynamic Factor Model, and L-Splines.
- A brief discussion of the commercial and open source software available for linear state space modeling. The data analysis in the workshop will be done by using PROC SSM, a procedure for state space modeling in SAS/ETS.
- Data analysis examples (as time permits):
  - Analysis of the yield curve for a set of US Treasury securities by using dynamic Nelson-Siegel factor model
  - Developing a business condition index similar to the Aruoba-Diebold-Scotti business condition index for now-casting the US economy
  - Structural break analysis for a bivariate time series
  - Variable band-width smoothing for a longitudinal sequence

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