

**Title:** Dynamic Longitudinal Modeling

**Abstract:** The goal of this workshop is to introduce participants to advanced modeling techniques, focusing on dynamic approaches to analyzing change and variability. We will begin by differentiating static and dynamic models, discussing their respective strengths and weaknesses, and exploring the fundamentals of dynamic modeling, including practical tools and software.

Throughout the workshop, we will cover key topics such as addressing heterogeneity, applying hierarchical models, analyzing individual-level data, and exploring innovative study designs. Participants will also be introduced to cutting-edge methods for causal inference and the integration of machine learning into dynamic modeling, with an emphasis on their practical applications and current limitations.

While examples will primarily draw from applied research, the workshop is designed for participants with an interest in quantitative methods. Prior experience with multivariate analysis is beneficial but not required, and familiarity with structural equation modeling and longitudinal data analysis is helpful. Emphasis will be placed on practical implementation using datasets and software tools.

**Prerequisites:** Participants should bring their own laptops with the latest versions of R and RStudio installed. Those new to R are encouraged to familiarize themselves with its basic functionality. Advanced knowledge of R is not necessary for participation.

## Time Schedule:

- Monday, 30<sup>th</sup> June
  - 18.00-22.00 Opening session, keynote talk and joint dinner
- Tuesday, 01<sup>st</sup> July
  - 09.00-11.00 Static versus dynamic models
  - 11.30-12.30 An introduction to continuous time dynamic modelling
  - 12.30-14.00 Lunch break
  - 14.00-15.30 An introduction to the R package ctsem & the state space representation
  - 15.45-17.15 Group exercise & hands-on example with ctsem
  - 17.30-18.30 Sport & games
  - 18.30 Discussion round “structured doctoral programs”
- Wednesday, 2<sup>nd</sup> July
  - 9.00-10.30 Some remarks on interpreting parameters in dynamic panel models
  - 11.00-12.30 Dealing with between-person heterogeneity: hierarchical models
  - 12.30-14.00 Lunch break
  - 14.00-15.00 Keynote talk
  - 15.15-16.30 Input effects
  - 16.45-17.45 Practice session (Q&A)
  - 18.00 Get-Together “Compatibility of work and private life”
- Thursday, 3<sup>rd</sup> July
  - 9.00-12.30 Special topics 1
    - a) Time series
    - b) Higher-order models
    - c) Oscillations (optional)
    - d) Latent change score models (optional)
    - e) Accelerated longitudinal designs (optional)
  - 14.00-15.45 Special topics 2
    - a) Dealing with within-person heterogeneity: heterogeneity in time & multiple time scales
    - b) Individual consulting
  - 16.00-18.30 Poster session with refreshments and snacks
- Friday, 4<sup>th</sup> July
  - 9.00-13.00 Special topics 3
    - a) Regularized ct models
    - b) More on state space SDE estimation, interventions, and complexity
    - c) Reflections on causal inference from a ct perspective & final discussion
  - 14.00-15.45 Keynote talk and farewell session