

## Measurement and Structural Equation Models / Eldad Davidov

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### Course Outline:

The course shows how a causal theory can be represented by a path diagram and translated into a structural equation model, and how the model can be estimated and tested with the AMOS graphics computer programme. In the first part, we deal with confirmatory factor analysis (CFA) relating single or multiple indicators to latent variables. Different specifications of measurement models are tested via CFA as a special case of a structural equation model (SEM). We show how comparisons across cultures or nations may be conducted. The second part comprises both the structural model and the measurement model. In this part topics include moderation and mediation, missing data, MIMIC models and multiple-group comparisons. Special attention is given to the process of model modification and alternative model testing using adequate fit measures and how to report CFA and SEM results. Finally, if time allows, we discuss how to analyze panel data. Participants will prepare their own data analysis, make a presentation in the final sessions and submit a short written report about their analysis. Participants are also requested to bring their own laptop and install SPSS and Amos on it in advance.

### Detailed Program:

**Meeting 1)** Introduction of participants. Organizational issues. **Overview of the whole course. Goals.**

**Meetings 2-7)** Operating systematic of the software AMOS and the logic of its use. Preparation of data. Confirmatory factor analysis in single and multiple groups. Model evaluation, global and detailed fit measures. Model modification and the strategy of theory testing: New factors, new factor loadings or residual correlations. Levels of measurement equivalence and source of non-equivalence. Model comparison with a chi square difference test and other criteria. Higher-order factor models and MTMM-Models (Multi Trait Multi Method). Equivalent models. Exercises with data on human values from the European Social Survey.

**Meetings 8-10)** Structural Equation Models (SEM) with latent variables and multiple indicators: Specification, identification and estimation. Causality and equivalent models. Typology of model testing. The „two step strategy“. Decomposition of effects. Multiple group comparison and interaction effects. SEM with multiple groups. Output interpretation. MIMIC-models (Multiple Indicators Multiple Causes): Specification and test. Exercises with data on human values and attitudes toward immigration from the European Social Survey.

**Meetings 11-14)** Working on own models. Counsultation, evaluation, modification and interpretation of participants' models. Participants' presentations. Open questions. Summary.

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Relevant internet homepages:

concerning the AMOS software: <http://www.spss.com/amos/>

concerning the ESS data: <http://ess.nsd.uib.no/>

concerning joining the SEMNET

discussion group: <http://www2.gsu.edu/~mkteer/semnet.html>