INTRODUCTION TO STRUCTURAL EQUATION MODELING (SEM) IN LISREL

PhD course, 7,5hp, Uppsala University, Spring 2021

The course is a collaboration between Department of Business Studies and Department of Statistics at Uppsala University

Introduction to Structural Equation Modeling (SEM) in LISREL

Spring 2021

Instructor:	Fan Yang Wallentin fan.yang@statistik.uu.se	Fan is a Professor at the Department of Statistics, UU. She has worked extensively with SEM and LISREL in cooperation with K.G. Jöreskog and D. Sörbom.
Contact Instructor:	James Sallis james.sallis@fek.uu.se	James is a Professor at the Department of Business Studies, UU. He has considerable practical experience with SEM & LISREL.

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This 7.5 point course introduces the logic and practical approach to structural equation modeling in LISREL. The emphasis is on the **practical use** of models and methods as research tools in the social and behavioral sciences. The course covers modern statistical aspects of regression models, exploratory and confirmatory factor analysis, and general structural equation models with or without latent variables for single and multiple groups and for continuous and ordinal variables. The course also covers the estimation of such models for normal, non-normal, and ordinal variables. This includes maximum likelihood, robust maximum likelihood, and various least-squares methods.

At the end of the course, successful participants will possess an enhanced theoretical and practical understanding of structural equation modeling and will be able to apply such models to real-world data for the analysis of models with, and without, latent variables.

Prerequisites: A basic understanding of statistics such as regression and exploratory factor analysis.

Teaching and learning methods: Fan and James will teach the entire course together as a team in the classroom. Participants are given copies of all overheads. We will provide the full version of LISREL 10.3 for the duration of the course. We highly recommend that participants install it and work through the examples in the classroom during lectures. Special consideration must be taken for installing LISREL on Macs since it was designed for installation on PCs.

Language: The course will be taught in English.

Evaluation: Participants are required to complete two computer lab exercises that focus on teaching participants how to apply structural equation modeling using LISREL.

Schedule: we will break for lunch at an appropriate time

Date	Time	Room*	Description
Tuesday 23.3	10:15-16:00	K334	From raw data to PRELIS and LISREL. Missing data, EFA, reliability Introduction to SEM, path analysis with observed variables, econometric models
Wednesday 24.3	10:15-16:00	K334	Measurement models Confirmatory factor analysis
Monday 12.4	10:15-16:00	K334	Full SEM (LISREL) models, fitting and testing models Analysis of ordinal variables with cross-sectional data
Tuesday 13.4	10:15-16:00	K334	Multi-group analysis Longitudinal data

*Ekonomikum at Kyrkogårdsgatan 10C. Room K334, 1 stair up, left, left.

Reference Literature:

- Karl G. Jöreskog, Ulf H. Olsson and Fan Y. Wallentin (2016) Multivariate Analysis with LISREL, Springer Series in Statistics ISBN978-3-319-33152-2
- Karl G. Jöreskog and Dag Sörbom. (1993) *LISREL 8 : structural equation modeling with the SIMPLIS command language*. Chicago, IL: Scientific Software International. (202 s). ISBN 0-89498-033-5
- Kenneth A. Bollen. (1989) *Structural equations with latent variables*. New York : Wiley. ISBN 0-471-01171-1
- Jöreskog, K. G. and Sörbom D. (1999) *LISREL 8: User's reference guide. SSI.*.
- Jöreskog, K. G. and Sörbom D. (1999) *PRELIS 2: User's reference guide. SSI.*.
- Jöreskog, K. G. *Paper: Structural Equation Modeling with Ordinal Variables using LISREL*.. http://www.ssicentral.com/techdocs/ordinal.pdf.