

## Multilevel Modelling with Mplus – Course Outline

*Course period:* June 1-3 2016

*Course structure:* The workshop is held at the Stress Research Institute at Stockholm University

*Instructor:* Professor Peter van der Heijden from Utrecht University

### *Overview*

In this 3-day course we introduce multilevel modelling using the Mplus statistical software. Well-known examples of multilevel data are encountered in education where pupils are nested in classes and in psychotherapy where patients are nested with therapists. Another example is where there are multiple within-person measurements, which are encountered in longitudinal data, or in the analysis of experiments with a within-subjects design.

Multilevel data are hierarchical data that need special consideration in a statistical analysis. In particular, the outcome variables of subjects within the same group cannot be considered to be independent. Ignoring such dependencies may result in drawing incorrect conclusions. The multilevel model explicitly takes the dependency of outcomes into account by formulating a model at each level of the multilevel data structure. Such a model also allows for heteroscedasticity, which is common with multilevel data.

This course provides a basic introduction to multilevel models. The basic multilevel model is introduced along with its assumptions and an analysis strategy. Estimation methods and the intraclass correlation coefficient are considered. An application to longitudinal data shows how to deal with repeated measures within-subjects. Initially, the course focuses on the linear multilevel model for continuous outcomes, and is then extended to multilevel logistic and ordinal logistic models, for categorical outcomes, on the final day. If time permits, multilevel structural equation models will be discussed.

Each day will consist of presentations and hands-on computer practicals using Mplus.

### *Who Should Attend?*

The target group is PhD students and other post-graduate level researchers, and allied professionals, in the social and behavioural sciences, and related disciplines. Participants will be assumed to have a working knowledge of standard regression modelling, in particular linear regression models. Participants should also have some knowledge of logistic regression models for modelling dichotomous outcomes – this can be obtained from Chapter 19 in Field (2013).

### *How You Will Benefit*

At the end of the course you will have a good working knowledge of multilevel modelling, and be able to fit and interpret models using the Mplus statistical software.

*What Do We Cover?*

*Day 1:*

- Introduction to the basic two-level regression model
- Comparisons with traditional approaches
- The empty model; models with fixed effects; models with random slopes
- Models with cross-level interactions
- Explained variance
- Contextual models
- Examples and case studies.

*Day 2:*

- Introduction to repeated measures; longitudinal data
- Univariate analysis techniques and comparison with traditional approaches
- Fixed and varying occasions
- Missing data; drop outs
- Multivariate modelling, with flexible error structures
- Examples and case studies.

*Day 3:*

- Dichotomous and ordinal outcome data
- Logistic regression models for modelling dichotomous and ordinal outcome variables
- Interpretation of models; effect measures; latent variable interpretation
- Explained variance
- Introduction to multilevel structural equation models (if time permits); multilevel factor models; multilevel path models
- Examples and case studies.

*Available Software*

This course has practical exercises written for: **Mplus**