

# Methods 3: Multilevel Statistical Modeling and Machine Learning

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## Description of qualifications

The purpose of the course is to further develop students' knowledge and skills in statistics and programming.

The course includes instruction on statistical techniques relying on the Generalised Linear Model, including multilevel modelling and basic machine learning procedures (e.g. predictive approaches and validation techniques). The course includes lectures on statistical and machine learning concepts as well as practical exercises in programming.

This course builds on the Methods 1 and 2 courses and provides skills and knowledge needed to understand and apply a wider variety of statistical and machine learning methods. The course prepares students for Bayesian computational modelling in the Methods 4 course, and provides techniques for data analysis relevant to exam projects in Social and Cultural Dynamics in Cognition, and in the Bachelor thesis project.

## Course Objectives

In the evaluation of the student's performance, emphasis is placed on the extent to which the student is able to:

Knowledge: - demonstrate understanding of statistical techniques relying on the Generalised Linear Model - demonstrate understanding of hierarchical modeling methods - demonstrate understanding of basic machine learning concepts.

Skills: - build and evaluate models of hierarchically structured data - integrate machine learning procedures in data analysis - communicate analysis processes, results and interpretation.

Competences: - independently decide on data analysis methods, given a data set and a research question - justify decision making when pre-processing messy data for data analysis.

## **Class Schedule**

Students must read the following before each session. Important: class readings are subject to change, contingent on mitigating circumstances and the progress we make as a class. Students are encouraged to attend lectures and check the course website for updates.

### **Week 01, 01/04 - 01/08: Introduction and Refresher**

- Slides
- Questions for discussion:
- Readings:

Dienes Z (2008). "Understanding psychology as a science: An introduction to scientific and statistical inference." In chapter 3: Neyman, Pearson and hypothesis testing. Springer.

### **Week 02, 01/11 - 01/15: The First Topic**

### **Week 03, 01/18 - 01/22: The Second Topic**

### **Week 04, 01/25 - 01/29: Another Topic**

### **Week 05, 02/01 - 02/05: The Fourth Topic**

### **Week 06, 02/08 - 02/12: Keep**

### **Week 07, 02/15 - 02/19: Going**

### **Week 08, 02/22 - 02/26: Down**

### **Week 09, 03/01 - 03/05: the**

### **Week 10, 03/08 - 03/12: Line**

### **Week 11, 03/15 - 03/19: Until**

### **Week 12, 03/22 - 03/26: You**

### **Week 13, 03/29 - 04/02: Are**

### **Week 14, 04/05 - 04/09: Done**

### **Week 15, 04/12 - 04/16: with**

### **Week 16, 04/19 - 04/23: your**

### **Week 17, 04/26 - 04/30: Syllabus**