Enrolment in Master's programme Neurocognitive Psychology.

**Goals of module:**

Students will acquire basic knowledge in planning empirical investigations, setting up computer controlled experiments, managing and understanding quantitative data and conducting a wide variety of multivariate statistical analyses. They will learn how to use the statistical methodology in terms of good scientific practice and how to interpret, evaluate and synthesize empirical results from the perspective of statistical modeling and statistical learning in basic and applied research context. The courses in this module will additionally point out statistical misconceptions and help students to overcome them.

**Competencies:**

++ interdisciplinary knowledge & thinking  
++ statistics & scientific programming  
++ data presentation & discussion  
+ independent research  
+ scientific literature  
++ ethics / good scientific practice / professional behavior  
++ critical & analytical thinking  
++ scientific communication skills  
+ group work

**Module contents**

**Part 1: Multivariate Statistics I (lecture)**

- Graphical representation of data  
- Basic concepts of probability  
- Frequentist and Bayesian statistical inference  
- The Generalized Linear Modeling framework (Simple, multiple and moderated linear regression, Analyses of variance as a specific case of the General Linear Model, Logistic regression)  
- Multilevel regression  
- Path modeling  
- Factor analysis (exploratory & confirmatory)  
- Structural equation modeling

**Part 2: Computer-controlled experimentation (seminar)**

- Computer hardware basics  
- Scripting and programming in Presentation  
- Combining stimulus delivery with EEG  
- Temporal precision

**Part 3: Multivariate Statistics II (lecture)**

- Supervised and unsupervised statistical learning and prediction  
- Regularized regression and non-linear models  
- Resampling methods  
- Tree-based methods and Support Vector Machines  
- Principal components and clustering

**Part 4: Evaluation research (seminar)**

- Paradigms and methods in applied evaluation research (quantitative, mixed-methods)  
- Types of studies and designs in evaluation research (experimental, quasi-experimental, (multiple) time series, etc.)
- Specific statistical tools (e.g., Propensity score matching)
- Research synthesis and meta-analysis

**Reader's advisory**

**Language of instruction**
English

**Duration (semesters)**
2 Semester

**Module frequency**
The module will be offered every winter term.

**Module capacity**
unlimited

**Modullevel**
MM (Mastermodul / Master module)

**Modulart**
Pflicht / Mandatory

**Lern-Lehrform / Type of program**
Parts 1 and 3: lectures; Parts 2 and 4: seminars; additional tutorials are offered.

**Vorkenntnisse / Previous knowledge**
basic statistics; otherwise please attend Introductory Course Statistics

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>part 1: 8 semester hours per week in the second half of the winter term, part 3: 2 semester hours per week in summer term</td>
<td>6.00</td>
<td>SuSe and WiSe</td>
<td>84 h</td>
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<tr>
<td>Seminar</td>
<td>Part 2: 2 semester hours per week in the winter term. Part 4: 2 semester hours per week in summer term</td>
<td>4.00</td>
<td>SuSe and WiSe</td>
<td>56 h</td>
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<tr>
<td>Tutorial</td>
<td>winter term: 2 hours/week (statistics) summer term: 2 x 2 hours/week (statistics and R)</td>
<td>0.00</td>
<td>SuSe and WiSe</td>
<td>0 h</td>
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**Total time of attendance for the module**
140 h

**Examination**
**Time of examination**
The module will be tested with an oral exam (20 min). Bonus for creating a script for the presentation on experimental stimuli in part 2.