

Module Number PP2	Title: Project Proposal		
Module type: compulsory		Language: English	Group Size: 1 student (course a, b); 20 students (course c, d)
Study semester: 3		Availability: winter semester	Duration: 8 weeks
Workload: 450 hrs	Credits: 15 CP	Contact time:	Independent Study:
1	Courses <ul style="list-style-type: none"> a) Placement b) Faculty Seminar 1 PPW c) Lecture Data Analysis 1 PPW d) Practical Course Data Analysis 2 PPW 		
2	Intended Learning Outcomes <p>The project proposal serves as a preparatory exercise for the Masters thesis. Students perform an 8-week placement in a working group on an experimental project of their choice. After completion a project sketch for the Masters thesis is to be drawn up. Lectures and practicals in statistical analysis of high-dimensional data support the ability of the students to analyse their data.</p> <p>After completing the module the students should be able to independently carry out a self-selected experimental project in the field of translational neuroscience. They are capable to draw up and present a written concept (project sketch) for the Masters thesis. Upon completion of the data analysis part the students will be able to perform statistical analyses of high-dimensional data from neuroscience such as sequencing or structural and functional MRI data. The students will acquire knowledge on statistical and bioinformatic approaches, e.g., for preprocessing the data and for assessing the quality of the data as well as machine learning and statistical methods such as multiple testing procedures, clustering, discrimination and regression approaches, and principle component analysis. They will be able to decide which of these methods to use in which situation and to apply these procedures to the data.</p>		
3	Content <p>a) Placement: Students perform an 8-week placement in a working group on a experimental project of their choice. The topic of the experimental work performed is variable and depends on faculty or working group.</p> <p>b) Faculty Seminar: The project is to be presented orally at the faculty seminar.</p> <p>c) Lectures Data Analysis: The course starts with a basic, practical introduction to the statistical software environment R, which is frequently used in the analysis of high-dimensional data. General statistical procedures such as multiple testing approaches, sampling methods (e.g., bootstrapping), clustering procedures (e.g., hierarchical clustering, k-means), discrimination methods (e.g., linear discriminant analysis, Random Forests, support vector machines), regression approaches (e.g., linear and generalized linear models), and dimension reduction procedures (e.g., principle component analysis) often used in the statistical analysis of high-dimensional data from neuroscience will be described, focussing on the practical aspects of these procedures. Moreover, procedures for preprocessing and quality control of data from, e.g., microarray, sequencing, and structural and functional MRI experiments in relation to genetic, environmental and performance data will be taught. Also more specific approaches for the different types</p>		

	<p>of data will be discussed, e.g., procedures for calling variants or determining gene expression values in sequencing experiments. This last part of the data analysis course will be tailored to the specific needs of the current Master students and will allow them to ask specific questions concerning the statistical/bioinformatic aspects of their project proposal.</p> <p>d) Practicals Data Analysis: All methods taught in the data analysis lecture will be practiced by the students by applying them to real high-dimensional data from different types of studies. If already available, the students can bring their own data and apply the procedures to these data during the practicals.</p>
4	<p>Teaching methods Practical course, lectures with accompanying exercises, project sketches, faculty seminar</p>
5	<p>Prerequisites Formal: Depends on faculty or working group; Successful completion of module "Pilot Project". Proficiency in English level B2 of Common European Framework of Reference for Languages (CEFR) With regards to content: Depends on faculty or working group.</p>
6	<p>Examination types: Written examination on data analysis</p>
7	<p>Requirements for award of credit points Participation in the placement and the faculty seminar, presentation of own results/data in the Faculty seminar and a concluding written project sketch for the Masters thesis, a pass in the module final exam. Return signed and filled in routing card to coordinator.</p>
8	<p>Module applicability (in other study courses)</p>
9	<p>Assessment The mark given will contribute to the final grade in proper relation to its credits.</p>
10	<p>Module convenor and main lecturers a) and b) Variable c) and d) Prof. Dr. Holger Schwender</p>
11	<p>Further information Register directly with the faculty/working group for the placement. Return signed and filled in routing card to coordinator.</p>