Anrechnung der Veranstaltungen der Graduiertenschule neurodapt! auf die erforderlichen Leistungen im Rahmen des PhD-Programms für Nichtmediziner

ID	GRADUATE SCHOOL / INSTITUTE Lecturer	*Course / seminar*	*Type of optional-Course*	Short description	Credit Points
II-IS-01	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*Cognitive Neuroscience Seminar*	*Inter-disci-plinary Courses*	A forum for researchers to share their work with the neurodapt community.	**1 CP** for participa-tion in 10 seminars
II-MS-01	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*MatLab Introduction*	*Research Method Courses*	Programming course. Theory and practice are taught in paral-lel. Flow and loop control, basic plotting, arguments and return values, control statements and manipulating text are some of the topics included.	**2 CP**
II-MS-02	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*MatLab Intermediate*	*Research Method Courses*	Programming course. After a short review of the last workshop, function handling for graphics and how to manipulate parents and children will be covered. The workshop will continue with how to use functions: scripting, sub-functions, multiple input / output variables, function handles and debugging. File handling and regular expressions will also be covered. If time permits, the workshop will end with basic data analysis.	**2 CP**
II-MS-03	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*MatLab Advanced*	*Research Method Courses*	Programming course. A continuation of the MatLab series. Ob-ject oriented programming is included.	**2 CP**
II-MS-04	**neurodapt! Graduiertenschule** Department of Systems	*MatLab Figures**	*Research Method Courses*	Programming course. Quickly generating a plot of data to un-derstand it can oftentimes be helpful and MatLab makes it easy to generate plots. This course will introduce basic plotting com-	**1 CP**

	Neuroscience			mands and manipulation of figure properties (parents and children). The focus will be on using command line and scripting rather than the plotting editor.	
II-MS-05	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*SPM Course (lectures and tutor sessions)*	*Research Method Courses*	Data Analysis Course. This course focuses on the analysis of fMRI time series. Lectures are part of the annual SPM course in September while tutoring sessions occur througout the year.	**2 CP**
II-MS-06	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*Cognitive Modeling**	*Resesarch Method Courses*	Modeling course for data. Goals of the workshop are: (1) learn how set up simulations of cognitive models, (2) learn how to fit models to data, (3) learn how to compare nested and non-nested models, (4) be able to turn own ideas of cognition into testable, mathematical models (that make sense)	**2 CP**
II-MS-07	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*1. Introduction to Electrophysiology* *2. Basic Neurobiology* *3. Basic Methods in Molecular Biology* *4. Introduction to Transgenic Animals*	*Research Method Courses*	-	**1 CP** for all four sessions
II-MS-08	**neurodapt! Graduiertenschule,** Department of Systems Neuroscience **Lecturer Dr. Matthias Gamer**	*Psychophysiology*	*Research Method Courses*	Measurement, analysis and interpretation of electrodermal, respiratory and cardiovascular data. Goals of the workshop are: (1) learn how set up experiments that make use of autonomic data, (2) learn about electrode placement, amplifier settings and filter adjustments, (3) learn how to analyze and interpret the acquired data. The workshop will include hands-on experience with laboratory equipment as well as practical sessions for data analysis.	2,5 days **2 CP**
II-MS-09	**neurodapt! Graduiertenschule** Department of Systems Neuroscience	*Measurement and Analysis of Eye-tracking Data**	*Research Method Courses*	In this workshop, different eye-tracking methodologies are going to briefly introduced with a special focus on the widely used pupil-corneal reflection technique that will also be demonstrated in a subsequent practical session. Afterwards, data processing and analysis will be described in detail, putting a special focus on the analysis andinterpretation	**1 CP**

				of fixations and saccades.	
II-MS-10	**neurodapt! Graduiertenschule**	*How to use shell scripts for efficiency**	*Research Method Courses*	The workshop will focus on basic shell scripting procedures.	**1 CP**
II-MS-11	**neurodapt! Graduiertenschule** **Dr. Arjen Alink**	*Multivariate Pattern Analysis**	*Research Method Courses*	Der hier angebotene eintägige Kurs dient als Einführung in die Analyse von fMRT-Daten mit Hilfe multivariater Analyseverfahren. Die Teilnehmer werden durch Beispiele zum selber ausprobieren Schritt für Schritt an die Methoden herangeführt. Für die Übungen dient „The Decoding Toolbox“ (Görgen, Hebart und Haynes, 2012), welches ein vielseitiges Instrument zur Analyse multivariater Daten mit Matlab und SPM darstellt.	**2 CP** 2 days of 8 hours
II-MS-12	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Maximilian Bruchmann**	*Matlab Psychophysics Toolbox**	*Research Method Courses*	The Psychophysics Toolbox - An Introductory workshop This course offers a hands-on introduction into programming experiments using MATLAB in combination with the Psychophysics Toolbox (PTB). Basic MATLAB skills are required. Participants will learn how do draw simple and complex visual stimuli, how to control their timing as precisely as possible and how obtain responses, including accurate response time measurements. A special emphasis will be laid on running fMRI experiments, i.e. how triggers are exchanged between the stimulation and acquisition computers	2 days of 8 hours **2 CP**
II-MS-14	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Selim Onat**	*Advanced Analysis in Neuroscience II*	*Research Method Courses*	Last two decades has seen an explosion of computational analysis methods, this spans a set of methodological recipes ranging from very general to extremely specific. Currently a scientist who is not up to date with these general methods can only rely on others to understand their own data and develop new methods. In this block lecture we are going though a set of very general methodological recipes that constitutes the "pen and paper" in Neurosciences. More technically, we will go through (preliminary list) convolution, auto/cross correlation, Fourier transform, time frequency decomposition, least-square fitting procedures, principle component analysis, singular value decomposition, bootstrap methods for statistical testing, information theory related	5 days x 8 hours; **2 CP**

				measures, goodness of fit evaluation and similarity measurements. In the morning sessions, the theoretical part will be dedicated to the explanation of these above mentioned concepts. The afternoon session will be practical, and participants will use Matlab (or similar, see above) to solve few problems, that are in connection with the morning sessions. During these sessions participants will have the chance to work with real neuronal data including spike recordings, voltage sensitive optical imaging, eye movement data and EEG. A session will end with informal presentation of the results.	
II-MS-15	**neurodapt! Graduiertenschule** Department of Systems Neuroscience**,** **Msc Lei Zhang**	*Bayesian statistics for cognitive modelling**	*Research Method Courses*	Introduction into Bayesian statistics; Hands on: calculating examples of Bayesian problems with known marginal likelihood; Introduction to use R and JAGS, Hands on: Using R to control JAGS as a MCMC Sampler for problems with unknown marginal likelihoos; Introduction into cognitive modelling; Using Bayesian statistics for cognitive modelling; Practical session: Analyzing cognitive models with baysian statistics	2 days of 8 hours **2 CP**
II-MS-16	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Selim Onat**	*Advanced Numerical Methods In Neuroscience - Part 1: Introduction to Signal Processing Advanced Numerical Methods In Neuroscience - Part 2: An Overview of Multivariate Decompositions*	*Research Method Courses*	The lecture is designed to have tightly connected theoretical and practical parts. The idea is that participants will learn by doing themselves what has been thought in the theoretical section. Emphasis is given on the analysis of real neuronal or behavioural data: fMRI, SCR, optical imaging, eye movements, etc... The spirit of this lecture is not to understand different topics from a purely mathematical formalism perspective, but to make participants to start doing things on their own, and give them the initial spark for being more independent in the future. That is the reason why you are doing a PhD	2 days **2 CP**
II-MS-17	**neurodapt! Graduiertenschule** Department of Systems Neuroscience,	*R introduction/intermediate*	*Research Method Courses*	In this workshop, I will give an introduction to the programming language R. We will start out with the very basics, i.e. learning how to configure the R environment, how to install packages, and how to use R as a basic calculator. We will then move on to working with arrays and data frames, also looking	2.5 to 3 days plus preparation and homeworks

	Dr. Falk Eippert			at the various ways in which additional packages allow graceful handling and manipulations of these structures. Next up will be the use of conditional statements and loops, as well as data input and output. We will then spend some time on the numerous plotting options that come with R and will finally spend a large amount of time on actual data analysis with R, because this is the area in which R is absolutely amazing.	**2 CP**
II-MS-18	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Falk Eippert**	*R advanced statistics*	*Research Method Courses*	This session will be solely focussed on statistics with R. On the one hand, we will look at comparing means: we'll start with a t-test and move via simple, factorial, repeated-measures and mixed ANOVAs to MANOVAs. On the other hand, we will look at regression: here, we'll start with simple linear regression and then move to more complex models (involving model selection and regularization with techniques such as ridge regression, lasso, principal components regression). Most of this will be done in a linear-model context, in order to highlight the similarity between these seemingly disparate tests. Along the way we will also look at resampling methods (cross-validation, bootstrapping) and unsupervised learning approaches (principal component analyses, clustering)	2.5 to 3 days plus preparation and homeworks **2 CP**
II-MS-19	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Eszter Schoell**	*Machine Learning*	*Research Method Courses*	Machine Learning, also called Statistical Learning, is a set of tools for modeling and understanding complex datasets. With the explosion of "Big Data", machine learning has become a very hot field in many disciplines. This course aims to give an introduction to common methods for clustering, classification and regression with hands-on code examples in R. Optimizing models and visualizing results will also be covered. For certification, students will be expected to analyze a dataset by submitting code, performance measures and visualizations.	2.5 to 3 days plus preparation and homeworks **2 CP**
II-MS-20	**neurodapt! Graduiertenschule** **Prof. Sebastian Gluth**	*Models in Judgement and Decision Making*	*Research Method Courses*	This course is an introduction to a variety of the most prominent and important models in judgment and decision making. Among the models that will be discussed are Expected Utility Theory, Prospect Theory, Rule-based vs. exemplar-based judgment models, drift diffusion models DDM, Intertemporal	2.5 to 3 days plus preparation and homeworks

				Choice models, Social Preferences Models (e.g., Fehr-Schmidt), and Game Theory. These models and theories will be first theoretically introduced and then the participants will learn how to use them to model behavioral data and implement them in Matlab.	**2 CP**
II-MS-21	**neurodapt! Graduiertenschule** **Prof. Sebastian Gluth**	*Sequential Sampling Models of Decision Making*	*Research Method Courses*	This workshop is a detailed theoretical and practical introduction to sequential sampling models. Not only drift diffusion models as the most prominent class of such models but also multiattribute decision field theory, leaky competing accumulator and linear ballistic accumulator models will be discussed and employed to model behavioral data using Matlab.	2.5 to 3 days plus preparation and homeworks **2 CP**
II-MS-22	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Pascal Jordan**	*Advanced regression Models*	*Research Method Courses*	Not only neuroimaging data are analyzed using regression models but they become also increasingly popular for the analyses of behavioral data. This course is a theoretical and practical introduction to specific regression problems as orthogonality or multicollinearity that are of relevance for neuroscientific and behavioral data analyses. Moreover, advanced regression models as for instance mixed effects models will be explained. The participants of this workshop are invited to send their specific regression problems and questions to the lecturer.	2.5 to 3 days plus preparation and homeworks **2 CP**
II-MS-23	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Dr. Niklas Wilming, Jan Willem DeGee**	*Introduction to Python*	*Research Method Courses*	Python becomes an increasingly popular programming language in neuroscience. This course is an introduction with many practical sessions which will enable participants not only to code their own analyses but also to use the available (neuro-) scientific toolboxes and packages.	2.5 to 3 days plus preparation and homeworks **2 CP**
II-MS-24	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Paul Lubos**	*Introduction to Unity - Virtual Reality for Neuroscientists*	*Research Method Courses*	In recent years, there is a strong trend in behavioral and imaging neuroscience to use more ecological valid and naturalistic stimuli in experimental paradigms to investigate for instance spatial abilities or memory. Virtual realities are an excellent way to present naturalistic stimuli and complex scenarios in a controlled way with exact timing. Unity is a cross-platform game engine than has been developed to program both three-	2.5 to 3 days plus preparation and homeworks **2 CP**

				dimensional and two-dimensional video games and simulations. In this workshop the participants learn how to program	
II-MS-25	**neurodapt! Graduiertenschule** Department of Systems Neuroscience **Various member of the IfSN**	*Advanced Neuroimaging Analyses*	*Research Method Courses*	In this series of shorter workshops, various members of the Department of Systems Neuroscience will present various toolboxes in SPM - as for instance the CAT-toolbox, the ACID toolbox, RFX-plot - connectivity analyses - as DTI fiber tracking, PPIs, DCM, path and mediation analyses – but also other advanced analysis methods as for instance flatmaps.	2.5 to 3 days plus preparation and homeworks **2 CP**
II-MS-26	**neurodapt! Graduiertenschule, ISN,** Department of Systems Neuroscience **Dr. Jan Gläscher**	*Foundations of Cognitive Modelling*	*Research Method*	Data modeling course. Topics for this workshop are: 1.Introduction to Reinforcement Learning (RL) 2.Simple RL models (Value Itera-tion, Policy Iteration, TD Learning, Q-learning, SARSA, Advantage Learning, Actor Critic) 3.Principles of model checking, model estimation, and model selection Participants will get hands on ex-perience in programming an RL model, fitting the model, and model comparison, benefit of model simu-lations will be demonstrated Prerequisites: Matlab programming (Matlab Intermediate)	2 days of 8 hours **2 CP**
II-MS-27	**neurodapt! Graduiertenschule, ISN,** Department of Systems Neuroscience **Dr. Jan Gläscher**	*Reinforcement Learning (Advanced)*	*Research Method*	Data modeling course. Topics for this workshop are: 1.Advanced Reinforcement learn-ing (RL) models (model-based RL, Planning/DYNA, eligibility traces, POMDPs, multi-agent RL) Participants will learn to program advanced RL model and apply them to an example data set. Model simulations, model fitting and mod-el selection will be reviewed. Prerequisites: Matlab programming (Matlab Intermediate), Reinforce-ment Leanrning (Beginners)	2 days of 8 hours **2 CP**
II-MS-28	**neurodapt! Graduiertenschule, ISN,** Department of	*Hierarchical Bayesian Modeling*	*Research Method*	Data modeling course using JAGS (or possibly Stan). This workshop builds on and extends on the mate-rial covered in “Bayesian Statistics for Cognitive Modeling (Antonius Wiehler). Topics for this course are:	2 days of 8 hours **2 CP**

	Systems Neuroscience **Dr. Jan Gläscher**			1.Review hierarchical modeling and JAGS syntax 2.Program and fit different deci-sion-making models to exam-ple data 3.Evaluate quality of sampling (convergence, auto-correlation) 4.Model simulations for exploring models and for model recov-ery study 5.Importance of Prior distributions 6.Model selection for hierarchical modeling (DIC, WAIC, Bayes Fac-tor, transdimensional MCMC, prod-uct space method, Sav-age-Dickey method) This is a hands on course: partici-pants will learn to program their own models, extend them, and use JAGS for model selec-tion.	

* These courses require the independent analysis of a data set (i.e. homework) for full accredition

Please contact Tobias Sommer (t.sommer@uke.de) if you would like to participate at the courses from the neurodapt! graduate school.