



Course Catalogue

Winter semester 2018/19



Content

<u>1</u>	<u>PARTICIPATING INSTITUTIONS</u>	<u>3</u>
1.1	3
<u>2</u>	<u>FOCUS ON THEORETICAL NEUROSCIENCE</u>	<u>4</u>
2.1	RUNNING LECTURES.....	4
2.2	BLOCK COURSES	12
<u>3</u>	<u>FOCUS ON DATA ANALYSIS</u>	<u>13</u>
3.1	RUNNING LECTURES.....	13
3.2	BLOCK COURSES	15
<u>4</u>	<u>FOCUS ON COMPUTATIONAL MODELLING</u>	<u>17</u>
4.1	RUNNING LECTURES.....	17
4.2	BLOCK COURSES	19
<u>5</u>	<u>ADDITIONAL TOPICS</u>	<u>20</u>
5.1	RUNNING LECTURES.....	20
5.2	BLOCK COURSES	23
<u>6</u>	<u>SEMINARS</u>	<u>25</u>
6.1	RUNNING SEMINARS.....	25
6.2	BLOCK SEMINARS.....	29

1 Participating institutions

	Berlin	BCCN Berlin / Humboldt-University of Berlin / Technical University Berlin
	Bielefeld:	Bielefeld University
	Bochum:	Ruhr University Bochum
	Bonn:	University of Bonn / Center of advanced European studies and research
	Bremen	University of Bremen
	Chemnitz	Technical University Chemnitz
	Darmstadt	Technical University Darmstadt
	Frankfurt	Frankfurt Institute for Advanced Studies, Goethe University Frankfurt
	Freiburg	Bernstein Center Freiburg, University of Freiburg
	Giessen	Justus-Liebig-University Giessen
	Göttingen	BCCN Göttingen / Georg August University Göttingen
	Hamburg	University Medical Center Hamburg-Eppendorf
	Jülich	Jülich Research Center
	Köln	University of Cologne
	Leipzig	MPI for Mathematics in the Sciences
	Magdeburg	Center for Behavioral Brain Sciences Magdeburg
	München	BCCN Munich / Ludwig-Maximilians-University München / Technical University Munich
	Oldenburg	University of Oldenburg
	Osnabrück	University of Osnabrück
	Tübingen	BCCN Tübingen / Eberhard Karls University Tübingen

2 Focus on Theoretical Neuroscience

2.1 Running lectures

Acquisition and Analysis of Neural Data	
Type of the course:	Lecture Analytical/ Programming Tutorial Practical Course (Lab)/ weekly/ 2 x 4 h per week
Target audience/ prerequisites:	MSc, PhD Maths: 3 semesters Programming: basic Neuroscience: basic Progr. Lang.: Python
Institution / City:	BCCN Berlin/ Berlin
Lecturer(s):	Haynes et al.
Time / ECTS:	Winter and summer/ 5 - 12 ECTS
Brief description:	Acquisition of neural data (1st semester): large scale signals (fMRI, Berlin EEG, MEG etc) and cellular signals, hands-on experience with neural data acquisition techniques. Analysis of neural data (2nd semester): firing rates, spike statistics, spike statistics and the neural code, neural encoding, neural decoding, discrimination and population decoding, information theory, statistical analysis of EEG) data, spatial filters, classification, adaptive classifiers.
Additional info:	Runs for 2 semesters, possible combination would be the winter term course with focus on data acquisition, 5 ECTS without the project
Weblink:	https://www.bccn-berlin.de/courses-and-modules.html

Models of Higher Brain Functions	
Type of the course:	Lecture, Analytical Tutorial, Programming Tutorial/ 2 h weekly in winter- and 6 h weekly in summer semester
Target audience/ prerequisites:	MSc, PhD/ Maths: 3 semesters Programming: basic Neuroscience: basic Progr. lang.: Python
Institution / City:	BCCN Berlin/Berlin
Lecturer(s):	Haynes and Sprekeler
Time / ECTS:	winter and summer/2 -12 ECTS
Brief description:	Auditory and visual system, natural image statistics and sensory processing, motor system, psychology and neuroscience of attention, memory systems, executive control, decision making, science of free will and consciousness. Data modeling and essential statistics, psychometric methods, signal detection theory, models of visual processing, models of

visual attention, models of executive function. Signal processing, sensory and cognitive modeling using Python.

Additional info: Starts with seminar "Cognitive Neuroscience" in Winter Semester (2 ECTS), the rest runs during the summer term, multiple combinations possible

Weblink: <https://www.bccn-berlin.de/courses-and-modules.html>

Models of Neural Systems	
Type of the course:	Theoretical Lecture, Experimental Lecture, Analytical Tutorial, Computer Tutorial/weekly/8 h per week
Target audience/ prerequisites:	MSc, PhD/ Maths: 3 semesters Programming: basic Neuroscience: basic Progr lang.: Python
Institution / City:	BCCN Berlin/Berlin
Lecturer(s):	Lindner
Time / ETCS:	Winter/12 ECTS
Brief description:	Hodgkin-Huxley model, Channel models, Synapse models, Single-compartment neuron models, Models of dendrites and axons, Models of synaptic plasticity and learning, Network models, Phase-space analysis of neuron and network models (linear stability analysis, phase portraits, bifurcation theory).
Additional info:	Combinations of a subset of the courses for fewer ECTS possible
Weblink:	https://www.bccn-berlin.de/courses-and-modules.html

Stochastic Partial Differential Equations	
Type of the course:	Seminar/weekly/2 h per week
Target audience/ prerequisites:	MSc, PhD/ Maths: advanced Programming: basic Neurobiology: none
Institution / City:	Technische Universität Berlin, BCCN Berlin/Berlin
Lecturer(s):	Stannat
Time / ETCS:	Winter/3 ECTS
Brief description:	Participants should learn basic concepts, their theoretical foundation, and the most common models of stochastic evolution equations on Hilbert spaces with a view towards its applications to the modelling, analysis and numerical approximation of spatially extended neurons and neural systems subject to noise. Participants will learn basic techniques to analyze global properties of neural systems both qualitatively and quantitatively. Participants will also learn basic simulation techniques for stochastic neural systems and how to evaluate simulation output. Participants should also be able to adapt models to new problems as well as to develop new models of neural systems.

Contents include: Gaussian measures on Hilbert spaces, stochastic integration on Hilbert spaces, semilinear stochastic evolution equations, stochastic reaction diffusion systems, continuum limits of neural networks.

Weblink: <https://www.bccn-berlin.de/courses-and-modules.html>

Stochastic Processes in Neuroscience

Type of the course: Lecture/weekly/4 hours per week
 Target audience/ prerequisites: MSc, PhD/
 Maths: advanced
 Programming: basic
 Neurobiology: none
 Institution / City: Technische Universität Berlin, BCCN Berlin/Berlin
 Lecturer(s): Stannat
 Time / ETCS: Winter /6 ECTS
 Brief description: Participants should learn basic concepts, their theoretical foundation, and the most common models of stochastic processes used in computational neuroscience to model noisy neural systems. Participants will learn basic techniques to analyze the stochastic behavior of singles neurons and neural systems both qualitatively and quantitatively. Participants will also learn basic simulation techniques for stochastic neural systems and how to evaluate simulation output. Participants should also be able to adapt models to new problems as well as to develop new models of neural systems.
 Contents include: Brownian motion and stochastic calculus, stochastic models for single neurons (stochastic Hodgkin-Huxley model, stochastic integrate-and-fire models, random oscillators), coupled neurons with noise, synchronization, stochastic stability, stochastic neural fields, travelling waves.

Weblink: <https://www.bccn-berlin.de/courses-and-modules.html>

Theoretical Neurosciences: Computational Neuroscience I

Type of the course: Lecture, Math Exercises/
 weekly (alternating lecture/
 exercises)/
 starting on 3rd of December 2018 till 25th January, 2019, Wednesday and Friday from 2-4 pm
 Target audience/ prerequisites: Master (Bachelor)/
 Maths: 1 semester
 Programming: none
 Neuroscience: none
 Institution / City: Universität Bremen/Bremen
 Lecturer(s): Ernst et al.
 Time / ETCS: Winter/2 ECTS
 Brief description: Introduction to fundamental concepts in Computational Neuroscience. In the first term, we will study basic encoding and decoding schemes, analysis of neural signals, and the dynamics of single neurons. In the second term, we will focus on synapses and neural networks, and study emergent

phenomena such as computation and classification, learning and memory, pattern formation, and synchronization.

Additional info: Follow-up course in summer

Weblink: <http://www.masterneuro.uni-bremen.de/>

Theoretical Neurosciences: Statistical Methods	
Type of the course:	Lecture, Math + Programming Exercises/ weekly (alternating lect/exerc.)/ starting on 15th October till 23rd November 2018, Tuesday and Thursday 12-2 pm
Target audience/ prerequisites:	Master (Bachelor)/ Maths: 1 semester Programming: none Neuroscience: none
Institution / City:	Universität Bremen/Bremen
Lecturer(s):	Fehr et al.
Time / ETCS:	Winter/2 ECTS
Brief description:	The course will start with rehearsing methods from descriptive statistics, in particular on concepts important for understanding neuronal data. Subsequently, we will focus in parallel on methods useful for investigating the brain as an information-processing system, and on methods needed to analyze behavioral or neural data (e.g., EEG, fMRI, Electrophysiology). In this course, you will acquire the necessary skills to perform analysis of neural or behavioral data in a lab situation. In particular, you will learn how to plan experiments yielding meaningful statistics, and how to select and to apply appropriate statistical tests. In parallel, you will understand how to compute with probabilities and how to perform inference and estimation on noisy data. Hereby you acquire the competency to study encoding and decoding of information of the brain.
Weblink:	http://www.masterneuro.uni-bremen.de/

Theoretical Neuroscience	
Type of the course:	Lecture and exercise/weekly/4 h per week
Target audience/ prerequisites:	Bachelor, MSc, PhD Basic analysis, linear algebra and programming skills Progr lang: flexible
Institution / City:	Goethe University Frankfurt
Lecturer(s):	Kaschube et al.
Time / ETCS:	Spring 6 ECTS
Brief description:	This module provides an introduction to modern theoretical neuroscience with an attempt to cover all relevant spatial scales (from molecules to brain areas) as well as temporal scales (sub- millisecond to evolutionary times scales).

Theoretical and Computational Neuroscience: Collective dynamics of biological neural Networks II	
Type of the course:	Lecture/weekly/2 h per week
Target audience/ prerequisites:	MSc or BSc (Physics, Mathematics, Applied Informatics)
Institution / City:	Institute fuer Nichtlineare Dynamik, FB Physik, U Gottingen/ Goettingen
Lecturer(s):	Wolf, Priesemann et al.
Time / ETCS:	Summer/ 3 ECTS
Brief description:	Introduction to Neurophysics, Modeling and Methods, Nonlinear Dynamics, Statistical Physics, Neurobiology, Neural Networks. This lecture course offers an introduction to advanced modeling strategies for biological neural networks. After a short introduction to the biophysics of single cells and an overview of their basic firing patterns, we explain fundamental properties of networks models of neurons, starting from simple uniform connectivity and progressing to spatially extended and to arbitrarily complex interaction networks. These network models explain and predict key dynamical aspects of neural circuits, including irregular activity of cortical dynamics, feature selectivity, self-organization of neural maps, and the coordination of precisely timed spikes across networks. The summer term course has its focus on neural field models.
Additional info:	Language: English.
Weblink:	https://univz.uni-goettingen.de/

Introduction to Computational Neuroscience	
Type of the course:	Lecture and exercise/weekly/3 h per week
Target audience/ prerequisites:	MSc (biology, physics, ect.)/ mathematical background; considerable advantage: programm skills Progr lang.: Python
Institution / City:	RWTH Aachen University/Jülich
Lecturer(s):	Grün et al.
Time / ETCS:	Winter/biology: 6 ECTS; math: 7,5 ECTS; physics: 10 ECTS
Brief description:	Models of neurons, synapses and networks; concepts of neuronal coding and cortical information processing; plasticity and learning. Data analysis and visualization by self-written programs; Usage of scientific programming languages (Matlab and Python), also for documenting the analyses; hypothesis tests by numerically generated modified data ('surrogate data'); Simulation of neuronal circuits.
Additional info:	This course is taught in combination with "Cortical Structure and Function" taught during the winter semester. This course can also function as Computational Neuroscience (I), if "Cortical Structure and Function" is used as (II). However, I is not a prerequisite for II.
Weblink:	http://www.campus.rwth-aachen.de/



	Geometric and topological methods for the analysis of data in biology, neurobiology and other fields
Type of the course:	Lecture/weekly/2 h per week
Target audience/ prerequisites:	Master and PhD students with some background in mathematics
Institution / City:	Max Planck Institute for Mathematics in the Sciences/Leipzig
Lecturer(s):	Jost
Time / ETCS:	Winter
Brief description:	Many data can be organized as networks, or more generally, as simplicial complexes or hypercomplexes, possibly weighted and/or directed. We develop mathematical tools to analyze such structures systematically. This is a continuation of the course from the last term, but newcomers are welcome, and the material will be organized accordingly.
Additional info:	Language: English
Weblink:	https://www.mis.mpg.de/

	Computational Neuroscience: A Lecture Series from Models to Applications
Type of the course:	Lecture/weekly/2 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU, TUM/Munich
Lecturer(s):	Herz, Luksch, Seeber, Thurley et al.
Time / ETCS:	Winter 2018/19 + Summer 2019 3 ECTS
Brief description:	Interdisciplinary lecture series taught by neuroscience experts from TUM and LMU that provides an introduction to computational neuroscience. General overview: Anatomical and physiological basis of neuroscience Modeling: Neural dynamics and coding Towards integration in the nervous system Engineering for Neuroscience and Neuroprothetics
Weblink:	http://bccn-munich.de/teaching/computational-neuroscience

	Fundamentals in Neuroscience
Type of the course:	Lecture and exercise/weekly/2+2 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU/Munich
Lecturer(s):	Busse, Grothe et al.
Time / ETCS:	Winter 2018/19 5 ECTS
Brief description:	The lecture gives an introduction to the following topics: Neurons & glia, passive membrane properties, ion channels, cation potentials, synaptic transmission, transmitter systems, cellular networks, motor systems, learning and memory, sensory systems, orientation, echolocation.



Computational Neuroscience	
Type of the course:	Lecture and Tutorial/weekly/3 hours per week
Target audience/ prerequisites:	Bachelor, Master/ Maths: 1 semester Progr lang.: Matlab
Institution / City:	TUM/Munich
Lecturer(s):	Macke et al.
Time / ETCS:	Winter 2018/19, 6 ECTS
Brief description:	Introduction to modern theoretical neuroscience from mechanistic to normative approaches. Keywords: Spiking neurons, resting membrane potential, ion channels, action potential, Hodgkin- Huxley model, phase plane analysis, leaky integrate-and-fire model, synaptic transmission, synaptic plasticity, neural networks, attractor networks, analysis of spike trains, optimal estimation, minimum variance, maximum likelihood, maximum a-posteriori, mechanisms of sensory fusion, modeling of sensorimotor systems.

Theoretical Biophysics and Cellular Physiology	
Type of the course:	Lecture and exercise/ weekly/2+2 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU/Munich
Lecturer(s):	Leibold, Borst et al.
Time / ETCS:	Winter 2017/18
Brief description:	This course covers the mathematical foundations of cellular physiology, ranging from the ionic basis of the membrane potential to electrochemical signaling to the propagation of action potentials in axons and dendrites of neurons based on the Hodgkin-Huxley model of the squid giant axon. Students learn the basics of dynamical systems theory and computational neuroscience.

The Neural Code	
Type of the course:	Lecture and exercise/weekly/2+2 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU/Munich
Lecturer(s):	Leibold, Wachtler et al.
Time / ETCS:	Winter 2018/19, 3 ECTS

Neuro-informatics	
Type of the course:	Lecture + Seminar/weekly/2+2 h per week
Target audience/ prerequisites:	Master/ Statistics, basic mathematics and programming skills
	Progr lang.: Python, R
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Pipa et al.
Time / ETCS:	Winter/12 + 4 ECTS
Brief description:	Theoretical Neuroscience
Additional info:	
Weblink:	http://coqsci.uni-osnabrueck.de/

Probabilistic Modeling of Perception and Cognition	
Type of the course:	Lecture and Tutorial/weekly/2+2 h per week
Target audience/ prerequisites:	Master/ Statistics, basic mathematics and programming skills
	Progr lang.: Python, R
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Jäkel et al.
Time / ETCS:	Winter/8 ECTS
Brief description:	Probability theory, judgment and decision making, choice models, signal detection theory
Additional info:	
Weblink:	http://coqsci.uni-osnabrueck.de/

Models of neural systems	
Type of the course:	Lecture + math tutorial with exercises/weekly/4h per week
Target audience/ prerequisites:	Master, Bachelor/ Math 1 semester, programming none, neuroscience basic
Institution / City:	Institute for Neurobiology, University of Tübingen/Tübingen
Lecturer(s):	Benda
Time / ETCS:	Winter/6 ECTS
Brief description:	The lecture introduces models of neurons of different complexity from the detailed Hodgkin-Huxley models for action potential generation via integrate-and-fire models to simple firing rate models. Based on these specific examples basic concepts of differential equations, linear system theory, dynamical systems theory and stochastic systems are introduced. These tools are essential for modelling neural systems and other complex systems like, for example, signaling cascades and population dynamics. Central to the module are the exercises that match the topics from the lecture and repeat the necessary math basics.
Additional info:	The lecture and exercises are tailored to biologists
Weblink:	http://www.neuroschool-tuebingen.de/

Neural Dynamics	
Type of the course:	Lecture/weekly/2 h per week
Target audience/ prerequisites:	Master PhD/ Math: 3 semesters Programming: fluent Biology: basic Progr lang.: Matlab
Institution / City:	Graduate Training Center of Neuroscience/Tübingen
Lecturer(s):	Giese
Time / ETCS:	Winter/6 ECTS
Brief description:	This course treats the basic biophysics of the signal generation and transmission in neurons and discusses how the underlying physical and physiological phenomena can be approximated by mathematical models. Typically, such models can be characterized as nonlinear dynamical systems.
Additional info:	
Weblink:	http://www.neuroschool-tuebingen.de/

2.2 Block courses

Computational Neuroscience - Introduction	
Type of the course:	6 weeks full-day block course, including lecture, seminar, hands-on programming exercises Dec 2018/Jan 2019
Target audience/ prerequisites:	MSc, PhD programming experience (preferably Matlab)
Institution / City:	University of Oldenburg, MSc Neuroscience/Oldenburg
Lecturer(s):	Kretzberg, Hildebrandt, Greschner, Ashida
Time / ETCS:	winter/12 ECTS
Brief description:	This intense block course provides some theoretical background, extensive hands-on programming exercises in Matlab and interpretation of the obtained modeling results. The course is structured in 6 weeks: Weeks 1&2: Spike train analysis, statistical models. Weeks 3&4: Biophysical models of single neurons. Weeks 5&6 Small network models
Additional info:	Course is held in English
Weblink:	http://www.uni-oldenburg.de/en/neurosciences/

3 Focus on data analysis

3.1 Running lectures

Machine Intelligence	
Type of the course:	Lecture Maths Tutorial/ weekly/ 2 x 4 h per week
Target audience/ prerequisites:	MSc, PhD/ Maths: 3 semesters Programming: basic Neuroscience: none Progr. Lang.: Python, Matlab, R
Institution / City:	Technische Universität Berlin, BCCN Berlin/Berlin
Lecturer(s):	Obermayer
Time / ETCS:	Winter and summer/ 2 x 6 ECTS
Brief description:	Artificial neural networks: Connectionist neurons, the multilayer perceptron, radial basis function networks, learning by empirical risk minimization, gradient---based optimization, overfitting and underfitting. Learning theories and support vector machines: statistical learning, learning by structural risk minimization. Probabilistic methods: Bayesian inference and neural networks, generative models. Projections methods. Principal Component Analysis, Independent Component Analysis and blind source separation. Stochastic optimization. Clustering and embedding.
Additional info:	Runs for 2 semesters, each semester can be taken separately for 6 ECTS
Weblink:	https://www.ni.tu-berlin.de/

Statistical mechanics of neural networks	
Type of the course:	Lecture and Exercise/weekly/3 h per week
Institution / City:	RWTH Aachen
Lecturer(s):	Helias
Time / ETCS:	Winter
Brief description:	The neural networks of the brain form one of the most complex systems we know. Many qualitative features of the emerging collective phenomena, such as correlated activity, stability, response to inputs, chaotic and regular behavior, can, however, be understood in simple models that are accessible to a treatment in statistical mechanics. This course presents the fundamentals behind contemporary developments in neural network theory [e.g. 1,2] that are based on methods from statistical mechanics of classical systems with a large number of interacting degrees of freedom. The focus on classical systems allows us to introduce the standard language and tools employed in statistical field theory in a simple and didactic form moments, cumulants, generating function[al]s, Wick's theorem, linked cluster theorem, perturbation theory, Feynman diagrams, mean-field approximation, loopwise expansion). We will explain and derive these concepts as far as they are needed in the context of neural networks. This first part will be familiar to students with some knowledge in (quantum) field theory and statistical physics.
Weblink:	https://online.rwth-aachen.de/

Fundamentals of Computer Science for Neuroengineering	
Type of the course:	Lecture/weekly/4 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	TUM/Munich
Lecturer(s):	Macke et al.
Time / ETCS:	Winter 2018/19
Brief description:	Introduction to computer science, computer programming, and data processing. Differences between programming procedural vs object oriented; discussing efficiency of code execution vs. simplicity of programming; introduction to programming in C, python and matlab (or similar respective environments).
Weblink:	https://campus.tum.de/

Fundamentals of Mathematics for Neuroengineering	
Type of the course:	Lecture/weekly/4 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	TUM/Munich
Lecturer(s):	Macke et al.
Time / ETCS:	Winter 2018/19
Weblink:	https://campus.tum.de/

Machine Learning I	
Type of the course:	Lecture + Practice/weekly/2+2+2 h per week
Target audience/ prerequisites:	Bachelor, Master/ Statistics, basic mathematics and programming skills Progr lang.: MatLab, Python
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Heidemann et al.
Time / ETCS:	8 + 4 ECTS
Brief description:	The course gives an introduction to unsupervised and supervised techniques of machine learning and data mining: Decision trees, clustering, dimension reduction, classification and artificial neural networks.
Weblink:	http://coqsci.uni-osnabrueck.de/

Machine Learning II	
Type of the course:	Seminar/weekly/2+2+2 h per week
Target audience/ prerequisites:	Master, PhD/ Statistics, basic mathematics and programming skills Progr lang.: MatLab, Python, R
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Kühnberger et al.
Time / ETCS:	4 ECTS

Brief description: Important frameworks for advanced methods in Machine Learning are discussed in this course. This includes e.g. SVMs, probabilistic methods, and reinforcement learning.

Weblink: <http://cogsci.uni-osnabrueck.de/>

Machine Learning I	
Type of the course:	Lecture/weekly/2 hours per week
Target audience/ prerequisites:	Master PhD/ Math: 3 semesters Programming: fluent Biology: none Progr lang.: Matlab
Institution / City:	Graduate Training Center of Neuroscience/Tübingen
Lecturer(s):	Dijkstra
Time / ETCS:	Winter/ 4 ECTS
Brief description:	This course will provide an introduction to important topics and algorithms in machine learning. A particular focus of this course will be on algorithms that have a clear statistical (and often Bayesian) interpretation.
Additional info:	
Weblink:	http://www.neuroschool-tuebingen.de/

Machine Learning I	
Type of the course:	Lecture and exercises, 3 h weekly
Target audience/ prerequisites:	Bachelor, Master/ basic knowledge of linear algebra and probability theory, basic familiarity with matlab
Institution / City:	Graduate Training Center of Neuroscience/Tübingen
Lecturer(s):	Bethge et al.
Time / ETCS:	Winter/4 ECTS
Brief description:	In this course, students will learn about important topics and techniques in machine learning, with a particular focus on probabilistic models. The course will cover supervised learning (linear regression algorithms, linear discriminants, logistic regression, nonlinear classification algorithms) and unsupervised learning (principal component analysis including several generalizations, k-means, mixture of Gaussians, Expectation-Maximization)
Weblink:	http://www.neuroschool-tuebingen.de/

3.2 Block courses

Advanced Course on Neural Data Analysis	
Type of the course:	Lectures, Tutorial, Exercises/block/2,5 weeks April 1-18, 2019, application deadline for SmartStart: Oct 5, 2018
Target audience/ prerequisites:	MSc, PhD/ good programming skills, background in mathematics (algebra) and statistics Progr lang.: Python

Institution / City:	Jülich Research Center, University of Cologne, LMU Munich/German Neuroinformatics Node/ Jülich/Cologne (Haus Overbach)
Lecturer(s):	Grün,Nawrot, Wachtler, et al.
Time / ETCS:	Winter /6 ECTS
Brief description:	This advanced course aims at providing deeper insights in state-of-the-art questions in neuroscience, analysis approaches and how to formalize questions to neuronal data so they can be answered quantitatively. The course addresse ecellent master studetns and PhD students interested in data analytics and in getting hands-on experience in the analysis of electrophysiological data (multiple-parallel spike trains and local field potentials). In the first week of the course, international experts will give lectures on statistical data analysis and data mining methods with accompanied exercises. In the second week the participants will pursue their own data analysis projects on a common data set.
Weblink:	https://portal.q-node.org/advanced-course-2019/

Introduction to Scientific Programming in Python with Application to Neural Data Analysis	
Type of the course:	Tutorials/ Exercises/ block/ 1 week, Feb 18 - 26, 2019
Target audience/ prerequisites:	MSc, no background required
Institution / City:	University of Cologne - Institute of Zoology
Lecturer(s):	Rostami, Nawrot
Time / ETCS:	Winter / 3 ECTS
Brief description:	This module will equip the student with basic skills of scientific programming with PYTHON and provide the student with hands-on experience in the statistical analysis of experimental neurophysioloigcal data sets and the adequate presentation of results. No previous programming skills are required.
Additional info:	max 2 places

Practical Short Course Methods for Computational Neuroscience	
Type of the course:	Practical course/one-week block
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU/Munich
Lecturer(s):	Leibold et al.
Time / ETCS:	Winter 2018/19

Practical Course Methods in Functional Imaging	
Type of the course:	Practical course/two-week block
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU/Munich
Lecturer(s):	Flanagin et al.
Time / ETCS:	Winter 2018/19 3 ECTS
Brief description:	Current statistical and computational methods of fMRI data analysis. Students learn to program and perform their own fMRI data analysis.

Neuroscientific Data Analysis in Matlab	
Type of the course:	7 weeks part-time, lecture and exercises, Oct - Nov
Target audience/ prerequisites:	MSc, PhD
Institution / City:	University of Oldenburg, MSc Neuroscience/Oldenburg
Lecturer(s):	Jannis Hildebrandt
Time / ETCS:	winter 6 ECTS
Brief description:	Introduction to Matlab, Readable Code: good practice, Data Import, basic statistics, frequency analysis, Continuous data (EEG/LFP), Behavioral data, Flow control, Spike data, Logical Indexing, complex data types, Variables and their scope, Advanced plotting & Matrix operations, Images, Object-oriented programming, Individual projects, Version control, Wrap up, Principles of data analysis
Additional info:	Course is held in English.

4 Focus on computational modelling

4.1 Running lectures

Computational Foundations of Cognitive Science	
Type of the course:	Lecture and Seminar/weekly
Target audience/ prerequisites:	MSc/ Calculus, Basic Probability and Statistics
Institution / City:	Technische Universität Darmstadt/Darmstadt
Lecturer(s):	Rothkopf et al.
Time / ETCS:	Winter/6 ECTS
Brief description:	Advanced introduction to cognitive modeling; levels of description: computational, algorithmic, and implementational models; computation as central paradigm for the understanding of intelligent systems and adaptive cognitive processes; emphasis on latent variable models, Bayesian graphical models, inference and learning.
Additional info:	
Weblink:	https://www.tucan.tu-darmstadt.de

Machine Learning I	
Type of the course:	Lecture and Exercise/weekly/4 h per week
Target audience/ prerequisites:	MSc, PhD/ Basic linear algebra and programming skills Progr lang.: flexible
Institution / City:	Goethe University/Frankfurt
Lecturer(s):	Kaschube, Ramesh et al.
Time / ETCS:	Winter/6 ECTS
Brief description:	Supervised, unsupervised and semi-supervised learning, reinforcement learning, Bayesian learning, Energy minimization and optimization.
Weblink:	https://qis.server.uni-frankfurt.de/

Computational Neuroscience: A Lecture Series from Models to Applications

Type of the course:	Lecture/weekly/2 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	LMU, TUM/ Munich
Lecturer(s):	Herz, Luksch, Seeber, Thurley et al.
Time / ETCS:	Winter 2018/19 + Summer 2019, 3 ECTS
Brief description:	Interdisciplinary lecture series taught by neuroscience experts from TUM and LMU that provides an introduction to computational neuroscience. General overview: Anatomical and physiological basis of neuroscience Modeling: Neural dynamics and coding Towards integration in the nervous system Engineering for Neuroscience and Neuroprosthetics
Weblink:	http://bccn-munich.de/teaching/computational-neuroscience

Computational Neuroscience

Type of the course:	Lecture and Tutorial/ weekly/ 3 hours per week
Target audience/ prerequisites:	Bachelor, Master/ Maths: 1 semester Progr lang.: Matlab
Institution / City:	TUM/Munich
Lecturer(s):	Macke et al.
Time / ETCS:	Winter 2018/19, 6 ECTS
Brief description:	Introduction to modern theoretical neuroscience from mechanistic to normative approaches. Keywords: Spiking neurons, resting membrane potential, ion channels, action potential, Hodgkin- Huxley model, phase plane analysis, leaky integrate-and-fire model, synaptic transmission, synaptic plasticity, neural networks, attractor networks, analysis of spike trains, optimal estimation, minimum variance, maximum likelihood, maximum a-posteriori, mechanisms of sensory fusion, modeling of sensorimotor systems.
Additional info: Weblink:	https://campus.tum.de/

4.2 Block courses

Compartmental Modeling of Biophysically and Anatomically Realistic Neurons	
Type of the course:	Research module, 4-6 weeks
Target audience/ prerequisites:	MSc, PhD (1st year) programming experience Prog lang.: NEURON (hoc, NMODL), Matlab, TREES toolbox
Institution / City:	Clinical Neuroanatomy, Goethe University Frankfurt
Lecturer(s):	Jedlicka et al.
Time / ETCS:	Winter & Summer
Brief description:	This research block provides opportunity to participate in a real research project; Topics: modeling neurons (from the hippocampus/cortex) at different levels, ranging from neurons with simplified morphology to neurons with full morphology; modeling synaptic plasticity in these neurons; learning techniques for building, managing, and using models that are closely linked to experimental data, especially those that involve hippocampal cells with complex anatomical and biophysical properties; coupling of compartmental modeling to morphological modeling (TREES toolbox)
Additional info:	Extension of this block course in the form of MSc thesis projects is available for highly interested and motivated students
Weblink:	https://sites.google.com/site/peterjedlicka/

Models for Neural Circuit Development	
Type of the course:	Research module, 4-6 weeks
Target audience/ prerequisites:	MSc or PhD/ Prog lang.: Matlab, C, Python
Institution / City:	Max Planck Institute for Brain Research/Frankfurt
Lecturer(s):	Gjorgjieva et al.
Time / ETCS:	Winter and summer
Brief description:	We will discuss the principles guiding the formation of sensory maps and receptive fields during circuit development. The students will examine how different mechanisms including: emergence of diverse single neuron properties and activity-dependent synaptic plasticity interact during development to give rise to functional circuits. The students will have the opportunity to analyze data from visual cortex and build their own models of the assembly and tuning of developing neuronal circuits.
Weblink:	http://www.izn-frankfurt.de/

5 Additional topics

5.1 Running lectures

Programming	
Type of the course:	Lecture, Programming Tutorial/ weekly (alternating lecture/ exercises)/ starting on 5th November till 21st December 2018, Tuesday and Thursday from 2-4 pm
Target audience/ prerequisites:	Master (Bachelor)/ Maths: none Programming: none Neuroscience: none Progr lang.: Matlab or Python
Institution / City:	Universität Bremen/Bremen
Lecturer(s):	Erhard et al.
Time / ETCS:	Winter/3 ECTS
Brief description:	Learn to write your own computer programs to analyse data and simulate neuronal systems. In the first half of the lectures and practical exercises, you will achieve the basic skills to write computer programs which perform simple calculations, and we will advise you how to break down a more complex problem into simple tasks a computer can perform. In the second half of the course, you will apply your acquired skills to analyse neural signals (mean and variance, estimation of firing rates, reverse correlation, ROC analysis, etc.), and simulate single neurons or synapses (integrate-and-fire neuron, Hodgkin-Huxley neuron).
Additional info:	
Weblink:	http://www.masterneuro.uni-bremen.de/
Systems Engineering Meets Life Sciences I	
Type of the course:	Lecture + Exercise/4 h per week
Institution / City:	Goethe University/Frankfurt
Lecturer(s):	Ramesh et al.
Time / ETCS:	Winter 2017/6 ECTS
Brief description:	This multi-semester course focuses on emerging interdisciplinary perspectives on 'Systems Science and Engineering for Intelligence'. We focus on natural systems, human and computer vision, bio-inspired vision system designs, and systems theory required for modeling, analysis, simulation and validation of cognitive vision systems. The emphasis is on abstractions, modeling, and rigorous statistical approaches to performance evaluation. Connections are also made between engineering designs and architectural designs in natural systems. The course draws upon years of systems engineering – involving systems modeling, analysis, and validation of computer vision systems and explores links them to latest viewpoints from Machine Learning, Artificial Intelligence, and Brain Sciences. The core emphasis in the course is that there is a natural correspondence between (Application Contexts, Tasks, Performance Requirements) and (Hardware and Software Programs and their Parameters). Paradigms popular for systems

design – model-based systems engineering vs data-driven machine learning will be contrasted. The course material is largely based on dissertations, publications, and online video material.

The objective of the course is to teach foundations in systems thinking that can be applied to design, analysis, and validation of intelligent systems.

Through case-studies in computer vision the students learn systems modeling, simulation and optimization of intelligent systems.

Additional info: The course can be offered as a blended learning course with a distributed team project executed as a block course for one to two weeks at the end of the semester, too.

Basics of Brain Connectivity

Type of the course: Lectures/1 month/4 lectures/
 Target audience/ prerequisites: MSc, PhD
 Institution / City: University Medical Center Hamburg-Eppendorf (UKE)/Hamburg
 Lecturer(s): contact: c.hilgetag@uke.de
 Time / ETCS: Flexible
 Brief description: Fundamental concepts; Structural connectivity; Functional connectivity; Clinical aspects
 Weblink: <http://www.sfb936.net/sfb-936-lecture-series>

Neuropsychiatric disorders

Type of the course: Lecture/monthly/6 Lectures
 Target audience/ prerequisites: MSc, PhD
 Institution / City: University Medical Center Hamburg-Eppendorf (UKE)/Hamburg
 Brief description: Schizophrenia, autism, bipolar disorder

Communication Acoustics

Type of the course: Lecture with integrated exercises/weekly/4 h per week
 Target audience/ prerequisites: MSc, PhD
 Institution / City: LMU/Munich
 Lecturer(s): Seeber et al.
 Time / ETCS: Winter 2018/19

Neuroprosthetics

Type of the course: Lecture with integrated exercises/weekly/4 h per week
 Target audience/ prerequisites: MSc, PhD
 Institution / City: TUM/Munich
 Lecturer(s): Hemmert et al.
 Time / ETCS: Winter 2018/19
 Brief description: The lecture covers the theoretical foundations of neuroprostheses. As the underlying principle of all neuroprostheses is the electrical excitation of neurons, we will cover this topic in depth using cochlea implants as an example. In the practical computer laboratory (2SWS), which complements the lecture (2SWS), we will program a solver for the cable equation of an active axon and implement a computer model of a cochlea implant.

Psychoacoustics and Audiological Applications	
Type of the course:	Lecture with integrated exercises/weekly/4 h per week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	TUM/Munich
Lecturer(s):	Seeber et al.
Time / ETCS:	Winter 2018/19
Brief description:	Binaural hearing: binaural cues, masking, directional hearing, movement perception, precedence effect, models; Hearing impairment: Kinds of hearing impairment, frequency selectivity and auditory filters, masking and across-frequency processes, loudness and recruitment, temporal and spectral processing, pitch perception, models of peripheral processing; Speech understanding: cues, models (Articulation Index, Speech Intelligibility Index), binaural speech understanding, effect of noise and reverberation on speech understanding; Auditory scene analysis; Music perception: Harmony, consonance, dissonance; Hearing aids: function and algorithms; Cochlear implants: function, algorithms, temporal and spectral resolution, speech understanding
Neural Experimental Techniques	
Type of the course:	Lecture/weekly/2 hours per week
Target audience/ prerequisites:	Master PhD/ Math: none Programming: none Biology: basic
Institution / City:	Graduate Training Center of Neuroscience/Tübingen
Lecturer(s):	Euler, Zeck
Time / ETCS:	Winter/3 ECTS
Brief description:	This course will provide a detailed overview of the experimental methods currently used in the Neurosciences to record (as well as modulate) neuronal activity – from the local activity with single-synapse resolution to population activity at the level of brain areas.
Weblink:	http://www.neuroschool-tuebingen.de/
Action & Cognition I	
Type of the course:	Lecture/ weekly / 2 hours per week
Target audience/ prerequisites:	Bachelor
Institution / City:	University of Osnabrück
Lecturer(s):	König, Gert
Time / ETCS:	Winter / 4 ETCS
Brief description:	In this lecture, and its follow-up Action & Cognition II in the summer term, we discuss the physiological substrate of cognitive processes with an emphasis on their relation to behavior. On your journey through the brain we will meet object recognition, attention, decision processes, movement planning and consciousness. A bias will be on physiological mechanisms, but due attention to clinical aspects, theoretical analysis and information theoretic measures will be given.
Additional info:	
Weblink:	https://www.uni-osnabrueck.de/

5.2 Block courses

Ethics and Neuroscience	
Type of the course:	Lecture, Group Work/block/1 week
Target audience/ prerequisites:	MSc, PhD/none
Institution / City:	BCCN Berlin, Berlin School of Mind and Brain/Berlin
Time / ETCS:	Winter/ semester break/2-3 ECTS
Brief description:	Philosophical theories of ethics, mental privacy, ethical aspects of animal experiments, ethical aspects of clinical neuroscience and patient research, good scientific practice, data protection and computer security, neurolaw, ethics committees.
Additional info:	International Winter School
Weblink:	https://www.bccn-berlin.de/events-list/winter-school-ethics-and-neuroscience-2019.html

Mathematics Prep-Course	
Type of the course:	Lecture/block/2 weeks
Target audience/ prerequisites:	MSc/ Maths: 3 semesters Programming: none Neuroscience: none
Institution / City:	BCCN Berlin/Berlin
Lecturer(s):	Schwalger
Time / ETCS:	Winter / semester break/4 ECTS
Brief description:	This course is intended as a refreshment of mathematical tools of analysis, linear algebra and statistics which will be necessary for the CNS students in the first year. Students will acquire broad mathematical knowledge of functions in one resp. several real variables, in linear algebra, in differential equations, in probability theory and statistics, as needed for Computational Neuroscience. Basic mathematical skills for the analysis and approximation of functions, solutions of differential equations and signals, for solving linear systems and systems of ordinary differential equations will be refreshed. Participants will learn to apply mathematical foundations to the modeling and analysis of neural data and to use basic mathematical techniques to problems in Computational Neuroscience with guided assistance.
Additional info:	Two-week course before new MSc students start their first term (Sep-Oct)
Weblink:	https://www.bccn-berlin.de/courses-and-modules.html

Neurobiology Prep-Course	
Type of the course:	Lecture/block/9 days
Target audience/ prerequisites:	MSc/ Maths: none Programming: none Neuroscience: none
Institution / City:	BCCN Berlin/Berlin
Lecturer(s):	Larkum
Time / ETCS:	Winter / semester break/2 ECTS

Brief description:	This course is intended as bridge for students without physiology training, enrolling in Computational Neuroscience. The aim is to provide the basics in neurophysiology.
Additional info:	One-week course before new MSc students start their first term (Sep-Oct)
Weblink:	https://www.bccn-berlin.de/courses-and-modules.html

Neurophysics - Labrotation (Advanced Studies II)

Type of the course:	Practical Course/block/6-7 weeks
Target audience/ prerequisites:	Master/ Maths: 1 sem. Programming: fluent Neuroscience: basic Progr lang.: Matlab or Python or other
Institution / City:	Universität Bremen/Bremen
Lecturer(s):	Ernst,Pawelzik et al.
Time / ETCS:	Summer or winter/ 15 ECTS
Brief description:	Labrotation on an actual research topic in Computational Neuroscience
Additional info:	
Weblink:	http://www.masterneuro.uni-bremen.de

In vivo Electro-physiology

Type of the course:	Practical course/modular/1 week
Target audience/ prerequisites:	MSc, PhD
Institution / City:	University Medical Center Hamburg-Eppendorf (UKE)/Hamburg
Brief description:	Introduction Surgery Recording protocols (extracellular, patch-clamp) Combination with other experimental approaches (imaging, optogenetics)

Research Module: Individual Project in Computational Neuroscience group

Type of the course:	individual student research project / lab rotation 6-8 weeks, flexible timing
Target audience/ prerequisites:	MSc, PhD Matlab
Institution / City:	University of Oldenburg, MSc Neuroscience/Oldenburg
Lecturer(s):	Kretzberg
Time / ETCS:	winter and summer, 15 ECTS
Brief description:	Students perform an individual research project (lab rotation) in the Computational Neuroscience Group. Topics and methods depend on the individual interests and backgrounds of the students. Invertebrate mechanosensory system: Electrophysiology, data analysis or modeling project. Vertebrate auditory system: Modeling project.
Additional info:	Course is held in English
Weblink:	https://www.uni-oldenburg.de/en/neurosciences/compneuro/teaching/

Research Module: Individual Project in Auditory Neuroscience group	
Type of the course:	individual student research project / lab rotation 6-8 weeks, flexible timing
Target audience/ prerequisites:	MSc, PhD Matlab
Institution / City:	University of Oldenburg, MSc Neuroscience/Oldenburg
Lecturer(s):	Kretzberg
Time / ETCS:	winter and summer 15 ECTS
Brief description:	Students perform an individual research project (lab rotation) in the Auditory Neuroscience Group. Topics and methods depend on the individual interests and backgrounds of the students. Vertebrate auditory system: Animal behavior, electrophysiology, anatomy, or data analysis project.
Additional info:	Course is held in English

6 Seminars

6.1 Running seminars

Computational Cognitive Modeling	
Type of the course:	seminar / 2 h per week/ Capacity is limited to 20 students
Target audience/ prerequisites:	Msc
Institution / City:	Institut für Neuroinformatik, Ruhr-Universität Bochum
Lecturer(s):	Cheng et al.
Time / ETCS:	Winter / 3 ECTS
Brief description:	The human mind is most intimately familiar to us, yet we understand very little about how it functions. To study the mind, the field of cognitive science pursues an interdisciplinary approach. One of the pillars of cognitive science is computational modeling. This seminar will survey models of perception, memory and action. Rather than focusing on the mathematical details, we will discuss the motivation, application and noteworthy properties of the models, including their strengths and shortcomings. Class work will include student presentations and discussions. The topics will be assigned to the students in the first meeting.
Weblink:	https://www.ini.rub.de/

Applied Cognitive Modeling	
Type of the course:	Seminar and Programming Lab/weekly
Target audience/ prerequisites:	Programming languages: e.g. Python, Matlab, BUGS/JAGS/Stan, R
Institution / City:	Technische Universität Darmstadt/Darmstadt
Lecturer(s):	Rothkopf et al.
Time / ETCS:	Winter/6 ECTS

Brief description: Advanced introduction to the implementation of cognitive models; levels of description: computational, algorithmic, and implementational models; reading, understanding, and implementing recent publications involving cognitive models, e.g. human information processing, decoding of physiological signals, artificial cognitive systems, machine learning in psychology, motor control.

Masters Thesis Project on Visual Perception

Type of the course: Lab Exchange/ weekly/ 1 h per week
 Target audience/ prerequisites: MSc
 Maths: 1 semester. Programming: fluent. Neuroscience: basic.
 Progr lang.: Matlab and/or Python. Familiarity with Caffe is an advantage.
 Institution / City: Justus-Liebig-Universität, Department of Psychology (FB6)/Giessen
 Lecturer(s): Fleming
 Time / ETCS: 2 Semesters
 Brief description: Masters projects for motivated students seeking a career in research are available in Roland Fleming's lab. Research in the lab focusses on mid- and high-level vision, including the perception of 3D shape (e.g. shape-from-shading) and the physical properties of objects and materials (e.g. viscosity, stiffness). We make extensive use of photorealistic computer graphics and simulations. The project would combine psychophysics with modeling (e.g. deep learning).

Sensation and Perception

Type of the course: seminar/weekly/2 h per week
 Target audience/ prerequisites: MSc
 Institution / City: Justus-Liebig-Universität, Department of Psychology (FB6)/Giessen
 Lecturer(s): Fleming et al.
 Time / ETCS: Winter or Summer, 3 - 5 ECTS
 Brief description: This is an introductory-level seminar series on the psychology and biology of visual perception. Topics include illusions, retina, contours, colour, motion, Gestalt psychology, faces and objects, attention and consciousness, computer vision, eye movements, neuropsychology and art. Each week 2-3 students present one paper each for 20 minutes. After each presentation there is a question and answer and discussion section. Each student can also receive a 30-min tutorial with me a few days before their presentation. Participants receiving five or more CP must also complete an essay on the same topic as their presentation.

Methods Academy "Multi-site Communication in the Brain"

Type of the course: Seminar/weekly/
 Target audience/ prerequisites: MSc, PhD/none
 Institution / City: University Medical Center Hamburg-Eppendorf (UKE)/Hamburg
 Lecturer(s): Trautmann-Lengsfeld/
 contact: strautma@uke.de
 Time / ETCS: Flexible

Brief description: MR imaging; Brain stimulation approaches; Methods of EEG/MEG data analysis; Statistics of complex networks; Computational modeling of large-scale brain dynamics

Weblink: <http://www.sfb936.net/sfb-936-lecture-series>

Advanced Seminar in Computational Neuroscience

Type of the course: Seminar/weekly/2 h per week
 Target audience/ prerequisites: MSc, PhD
 Institution / City: LMU/Munich
 Lecturer(s): Herz, Leibold et al.
 Time / ETCS: Winter 2018/19 + Summer 2019
 2 ECTS

Brief description: Special topics in computational neuroscience, incl. talks by guest speakers, review of new publications in the field and progress report on ongoing research projects

Seminar Neuronal Mechanisms of Vision

Type of the course: Seminar/weekly/2 h per week
 Target audience/ prerequisites: MSc, PhD
 Institution / City: LMU/Munich
 Lecturer(s): Wachtler
 Time / ETCS: Winter 2018/19
 2 ECTS

Seminar Spatial and Temporal Cognition

Type of the course: Seminar/weekly/2 h per week
 Target audience/ prerequisites: MSc, PhD
 Institution / City: LMU/Munich
 Lecturer(s): Flanagan, Thurley
 Time / ETCS: Winter 2018/19 + Summer 2019
 3 ECTS

Action & Cognition I + II

Type of the course: Seminar/weekly/2 h/week + Tutorials
 Target audience/ prerequisites: Master/
 Statistics, basic mathematics and programming skills
 Institution / City: Institute of Cognitive Science/Osnabrück
 Lecturer(s): König et al.
 Time / ETCS: 2 x 4 ECTS

Brief description: Advances topics in systems neuroscience and computational neuroscience

Weblink: <http://coqsci.uni-osnabrueck.de/>

Bayesian Statistics	
Type of the course:	seminar/weekly/2 h per week
Target audience/ prerequisites:	Master, PhD/Statistics, basic mathematics and programming skills Progr lang.: R, JAGS
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	König et al.
Time / ETCS:	4 ECTS
Brief description:	Bayesian statistics and modeling, JAGS,
Weblink:	http://coqsci.uni-osnabrueck.de/

Cognitive Human-Computer Interaction	
Type of the course:	seminar/ weekly/ 2 h per week
Target audience/ prerequisites:	Master/ Statistics, basic mathematics and programming skills Progr lang.: Python, R
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Lecturer: Kühnberger et al.
Time / ETCS:	4 ECTS
Brief description:	The course focuses on the cognitive basis relevant for the design of user interfaces, the development of user interfaces, and usability aspects of user interfaces.
Weblink:	http://coqsci.uni-osnabrueck.de/

Colloquium Computer Vision	
Type of the course:	Colloquium/weekly/2 h per week
Target audience/ prerequisites:	Bachelor, Master/ Statistics, basic mathematics and programming skills Progr lang.: MatLab, Python
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Lecturer: Heidemann et al.
Time / ETCS:	8 + 4 ECTS
Brief description:	The course starts with the basics of image processing and proceeds to computer vision, A focus is on object recognition.
Weblink:	http://coqsci.uni-osnabrueck.de/

Colloquium of the Institute of Cognitive Science	
Type of the course:	Colloquium/weekly/2+2 h per week
Target audience/ prerequisites:	Bachelor, Master/ Statistics, basic mathematics and programming skills Progr lang.: MatLab, Python
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Jäkel,König et al.
Time / ETCS:	2 ECTS
Brief description:	Various topics
Weblink:	http://coqsci.uni-osnabrueck.de/

Colloquium of the PhD Programme

Type of the course:	Colloquium/weekly/2 h per week
Target audience/ prerequisites:	PhD/Statistics, basic mathematics and programming skills
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Pipa et al.
Time / ETCS:	4 ECTS
Brief description:	Various topics
Weblink:	http://coqsci.uni-osnabrueck.de/

6.2 Block seminars

Osnabrück Computational Cognition Alliance Meeting

Type of the course:	Seminar + Workshop/yearly/TBA
Target audience/ prerequisites:	PhD/Statistics, basic mathematics and programming skills Progr lang.: MatLab, Python
Institution / City:	Institute of Cognitive Science/Osnabrück
Lecturer(s):	Jäkel, König, Pipa et al.
Time / ETCS:	4 ECTS
Brief description:	Computational Cognition
Weblink:	http://coqsci.uni-osnabrueck.de/
