

Course Guide – Master Cognitive Science

Summer 2015

Update: March 09

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Enrollment for Courses

Students in the first semester will be registered by the lecturers in the first session of each course. Advanced students (from the second semester on) are requested to register with the university's **VSPL**-system (info: vspl-support@rub.de) and should be aware of earlier VSPL-deadlines. Exceptions include the courses held by Wiskott, Schöner and Würtz. Here, there will be **no VSPL-registration**, but a manual enrollment in the first session.

BM. Basic Methods

General Remark Concerning BM3 – Neural Networks

A basic course in neural networks is obligatory. On the one hand, we recommend to study the basic methods ideally in the first semester; but to give students a bit more flexibility in arranging their program, we also offer the possibility to postpone the course on „BM3: Neural Networks“ to the summer semester (offered by M. Yoshida). Please discuss this option explicitly with Dr. Peter Brüssel or Prof. Albert Newen.

BM3.

Neural Networks

SEMINAR

BASIC NEURAL SIMULATION (118160)

PROF. MOTOHARU YOSHIDA

TERM:	Summer 2015
MEETING TIME:	Wednesday, 10.15 – 11.45 (First Meeting: April 8, 2015)
ROOM:	GAFO 04/615
CP:	5

The goal of this seminar is 1) to understand basic electrophysiological properties of neurons and 2) to learn how to implement this knowledge into a computational model of a neuron.

First, students will learn basic electrophysiological properties such as the maintenance of the resting membrane potential and the generation of an action potential through lectures. Students will then build their own neuron model using a programming environment called Matlab. Simulation using computers will not only help solidify the students' understanding of electrophysiological properties but also will allow them to use this knowledge in the future research. Acquiring this technique will enable students for example to estimate the consequence of a malfunction of certain ionic channel in a disease or to estimate the specific character of specific neuron types of their interest. Advanced students will have the opportunity to expand this single neuron model to a neural network model to simulate a role of a brain region of their interest. This course will also provide necessary skills regarding computational simulation and it does not require previous experience in modeling or programming. Basic knowledge about electric circuit would be of advantage.

C1.

Social Cognition & Meta-Science

*SEMINAR***MENTAL CAUSATION (030032)**

PROF. TOBIAS SCHLICHT

TERM:	Summer 2015
MEETING TIME:	Monday, 12.00 – 14.00 (First Meeting: April 13, 2015)
ROOM:	GA 03/46
CP:	6

This seminar will examine the relationship between mental causation – i.e. mental states and events making things happen in the physical world – and the doctrine of physicalism – the doctrine that in some sense everything is fundamentally physical. We will examine the role of the assumption of mental causation in the dominant argument for physicalism. Reductive and non-reductive physicalism will be explained; and we will look at the reasons why mental causation is supposed to generate a problem for *non*-reductive physicalism. Reading will be provided via blackboard before term starts.

Introductory Reading:

Jaegwon Kim: Physicalism, or something near enough. Princeton Univ. Press 2005, ch. 1-3

C1.

Social Cognition & Meta-Science

SEMINAR

SCIENTIFIC PLURALISM (030090)

DR. DUNJA ŠEŠELJA

TERM:	Summer 2015
MEETING TIME:	Tuesday, 14.00 – 16.00 (First Meeting: April 7, 2015)
ROOM:	GABF 04/358
CP:	6

In this seminar we will discuss different conceptions of scientific pluralism proposed in the recent literature, with a special focus on the relation between pluralism and cognitive goals of science, such as scientific objectivity. While a plurality of scientific inquiries in a given domain is often considered fruitful for scientific progress, disagreements among scientists advocating rivaling theories can also pose a threat to scientific objectivity. This motivates the question: which epistemic and methodological norms should guide scientists working in a domain that has a plurality of inquiries and theories? Depending on which cognitive goals and standards are prioritized, this question has been answered in different ways. While some have argued for a critical interaction among disagreeing scientists, others have argued for a restricted information flow between the rivaling camps. Moreover, the role of non-cognitive values (such as social, political, ethical or idiosyncratic values) in scientific practice introduces additional problems to normative accounts of scientific pluralism.

The exact course material will be provided during the course. The relevant literature includes the following:

- Carrier, M. (2013). Values and objectivity in science: Value-ladenness, pluralism and the epistemic attitude. *Science & Education*, 22, 2547-2568.
- Chang, H. (2012). *Is Water H₂O? Evidence, Pluralism and Realism*. Springer.
- Kellert, S. H., Longino, H. E., & Waters, C. K. (Eds.) (2006). *Scientific pluralism*. Minneapolis: University of Minnesota Press.
- Rolin, K. (2011). Diversity and dissent in the social sciences: The case of organization studies. *Philosophy of the Social Sciences*, 41, 470–494.
- Solomon, M. (2006). Groupthink versus the wisdom of crowds: The social epistemology of deliberation and dissent. *The Southern Journal of Philosophy*, 44, 2842.
- Zollman, K. J. (2010). The epistemic benefit of transient diversity. *Erkenntnis*, 72, 17–35.

C2.

Perception & Action

COMPACT COURSE & WORKSHOP

PAIN, EMOTION, AND SUFFERING (030042)

DR. KEVIN REUTER & PROF. MARKUS WERNING

TERM:	Summer 2015
MEETING TIME:	Thursday, April 9, 2015 – 14.00–20.00 Friday, April 10, 2015 – 10.00–18.00 Thursday, April 16, 2015 – 9.30–18.30 (International Workshop) Friday, April 17, 2015 – 9.30–15.30 (International Workshop) Saturday, April 18, 2015 – 9.30–15.30
ROOM:	GA 04/187
CP:	6

Suffering plays a complex role in people's lives and needs to be characterized by affective, motivational, and cognitive components. The ways in which one can suffer are extraordinarily diverse: sometimes involving bodily pain, sometimes other bodily feelings (e.g. nausea), sometimes emotions typically regarded as non-bodily, e.g. depressed mood and grief. This seminar will focus on the nature of emotions and pains, and on the respects in which emotional and physical suffering are similar and different, from an ethical, epistemological, neurological and phenomenal perspective.

This seminar is a 'Blockseminar' and will take place on 5 days (see below). An integral part of this seminar is an international workshop on 'Physical and Emotional Suffering' at which experts on pains and emotions will present their current research. Speakers include Ulrike Bingel (University Duisburg-Essen), Michael Brady (University of Glasgow), Jennifer Corns (University of Glasgow), Albert Newen (RUB), Kevin Reuter (RUB), Tobias Schmidt-Wilcke (RUB), Timothy Schroeder (Ohio State University), and Markus Werning (RUB).

Literature:

Aydede, M. (ed.) (2006). *Pain: new papers on its nature and the methodology of its study*. Cambridge, MA: MIT Press.

Consultation hours:

Dr. Kevin Reuter. Wednesday, 15:00-16:00. (during the semester)

Prof. Dr. Markus Werning. Tuesday, 15:15-16:00. (during the semester)

C2.

Perception & Action

*LECTURE & EXERCISE***AUTONOMOUS ROBOTICS: ACTION, PERCEPTION AND COGNITION
(310501 & 310511)**

PROF. GREGOR SCHÖNER

TERM:	Summer 2015
MEETING TIME:	
LECTURE:	Thursday, 14.15 – 16.00 (First Meeting: April 9, 2015)
EXERCISE:	Thursday, 16.15 – 17.00 (First Meeting: April 16, 2015)
ROOM:	NB 3/57
CP:	5

Neuroinformatics is concerned with the discovery of new solutions to technical problems of information processing. These solutions are sought based on analogies with nervous systems and the behaviour of organisms. This course focuses on three exemplary problems to illustrate this approach:

- (a) Artificial action (autonomous robotics);
- (b) Artificial perception (robot vision);
- (c) Artificial cognition (simplest cognitive capabilities of autonomous robots such as decision making, memory, behavioural organization).

The main methodological emphasis is on nonlinear dynamical systems' approaches and dynamic (neural) fields.

C3.

Memory, Learning & Decision Making

*COMPACT COURSE***PHILOSOPHY OF TEMPORAL EXPERIENCE (030050)**

DR. BRUNO MÖLDER (TARTU)

TERM:	Summer 2015
MEETING TIME:	First Meeting: April 7, 2015
ROOM:	GA 3/143
CP:	4

The course will focus on different contemporary approaches to the experience of time. It covers main phenomenological, analytic and neurophilosophical accounts of temporal experience. The following topics will be discussed: main accounts of the experience of time (Cinematic, Retentional and Extensional models), attempts to naturalize phenomenology of time consciousness, the relation between brain time and subjective time, temporal illusions.

The course includes classes, individual tutorials to discuss the students' work, and writing an essay. The classes (18 hours altogether) will cover the following topics:

1. Tue 07.04, 12-14 Uhr, GA 3, 143: Lecture: Temporal experience, philosophical issues
2. Thur 09.04, 16-18 Uhr, GA 3, 143: Seminar: Cinematic and Extensional Models (C. D. Broad)
3. Fri 10.04, 12-14 Uhr, GA 3, 143: Seminar: The Overlap Model (B. Dainton)
4. Tue 14.04, 12-14 Uhr, GA 3, 143: Lecture: Phenomenology of time consciousness
5. Thur 16.04, 16-18 Uhr, GA 3, 143: Seminar: Retentional Models (E. Husserl)
6. Fri 17.04, Uhr, GA 3, 143: Seminar: Neurophenomenology (F. Varela)
7. Tue 21.04, 12-14 Uhr, GA 3, 143: Lecture: Time consciousness in the brain
8. Thur 23.04, 16-18 Uhr, GA 3, 143: Seminar: Temporal illusions and the Multiple Drafts model (D. Dennett)
9. Fri 24.04, 12-14 Uhr, GA 3, 143: Seminar: Temporal representation (R. Grush)

Additional Tutorials (6 hours) take place weekly, 2 hours at a time on 7.04, 14.04 and 21.04 in GA 3,38.

C3.

Memory, Learning & Decision Making

*LECTURE & EXERCISE***COMPUTATIONAL NEUROSCIENCE: VISION AND MEMORY
(310504 & 310514)**

PROF. LAURENZ WISKOTT

TERM:	Summer 2015
LECTURE:	Tuesday, 12.15 – 13.45 (First Meeting: April 7, 2015)
EXERCISE:	Tuesday, 10.30 – 12.00 (First Meeting: April 14, 2015)
ROOM:	NB 3/57
CP:	6

This lecture presents models of selforganization in neural systems, in particular addressing vision (receptive fields, neural maps, invariances, attention) and associative memory (Hopfield network).

C3.

Memory, Learning & Decision Making

*SEMINAR***DISCOURSE IN EPISODIC MEMORY (118161)**

PROF. SEN CHENG

TERM:	Summer 2015
MEETING TIME:	Tuesday, 10.15 – 11.45 (First Meeting: April 7, 2015)
ROOM:	GA 04/187
CP:	3

When we remember events from our lives, whether they are the once-in-a-lifetime or everyday kind, we use our episodic memory. Although a small region of the brain called the hippocampus was identified to be important for episodic memories a long time ago, the nature and neural basis of episodic memory remain unclear. This class will employ a novel, highly interactive format to introduce the students to the cutting edge of the research into episodic memory. Students will be involved in choosing the literature discussed in class and discuss their views with an invited speaker who will also give a lecture in the Colloquium of the Institute of Cognitive Neuroscience (IKN).

C3.

Memory, Learning & Decision Making

*SEMINAR***DISCOURSE IN NEURAL DYNAMICS (118162)**

PROF. MOTOHARU YOSHIDA

TERM:	Summer 2015
MEETING TIME:	Wednesday, 14.15 – 15.45 (April 8, 2015)
ROOM:	GA 04/187
CP:	3

This discourse aims to deepen our understanding of the generation of brain functions. Our focus will be spatial navigation and memory functions in the medial temporal lobe (MTL). Students will learn neural dynamics underlying spatial navigation and memory through single unit recordings, intracellular recordings, functional imaging and theoretical modeling studies. Based on these studies and discussions, students will define their own new research directions and conduct a research regarding what is already known and what could be done as an interesting scientific project. Specific topics of this discourse could include (but not limited to) ,Place cells' in the hippocampus that fire dependent on the location of an animal in an environment, head direction cells in the presubiculum that fire dependent on the direction of animals head, and grid cells in the entorhinal cortex fire at many locations to form a hexagonal grid that covers each 2D environment, Theta phase precession of the place cells and the grid cells that provides evidences for phase coding and an optimized firing pattern for synaptic plasticity, and replay of activity of place cells during sleep which provides evidences for the possible role of the MTL in memory consolidation.

C3.

Memory, Learning & Decision Making

SEMINAR

LEARNING AND BEHAVIOUR (119013)

DR. ALEXIS GARLAND

TERM:	Summer 2015
MEETING TIME:	Tuesday, 14.00 – 16.00 (First Meeting: May 6, 2015)
ROOM:	GAFO 05/609
CP:	3

This practical participation-based course with online components will provide an applied overview of the psychological foundations of learning and behavior, touching on the neurophysiological basis of learning and memory processes with a view to potential applications in technology, therapy and other areas. Participants will present on various aspects of learning and behavior - such as habituation, sensitization, conditioning and extinction - and place our understanding of these mechanisms in a relevant real-world context. This course will aim at an overview of general knowledge, as well as an in-depth look at early and current examples of human and animal research studies.

Learning Objectives

1. Acquire general content knowledge about the field of 'Learning' and 'Behavior' within a psychological context.
2. Find, read and understand more specific in-depth knowledge related to content by looking at published experiments (primary source materials).
3. Comfortably, clearly and concisely present about both general and in-depth knowledge to peers.
4. Engage in classroom discussion, expanding upon and applying topics to experience.

Instructor: Dr. Alexis Garland

Office: GAFO 05/622

Phone: [+49 234 32 26845](tel:+492343226845)E-Mail: Alexis.Garland@rub.de

Text: Domjan, M (2009). The principles of learning and behavior (6th Edition)

Moodle Course ID: To Be Announced Password: To Be Announced

C4.

Language, Logic & Categories

*COMPACT COURSE***UNDERSTANDING SYMBOLS IN HUMANS AND ANIMALS:
PATTERN PERCEPTION AND REFERENTIAL MEANING (030092)**

DR. PIERA FILIPPI

TERM:	Summer 2015
MEETING TIME:	May 26-29, 2015: 9.00 – 12.00 and 13.00 – 15.00 May 30, 2015 (Saturday): 9.00 – 12.00
ROOM:	GABF 04/709
CP:	6

The aim of this workshop is to provide some theoretical background to address key topics on animal cognition through an interdisciplinary approach. The workshop is divided into three modules: a) methodological issues within interdisciplinary debates on animal communication and verbal language; b) philosophical investigation on pattern perception, referential communication and rational behaviors across species; b) neuroscientific and comparative approach to the pragmatic valence of sound modulation in vocal and musical interactions. The integration of these modules will be useful to understand and follow modern debates surrounding the evolution of communication and cognition. The style of the workshop will be mainly interactive; therefore students are expected to give short presentations (followed by discussions) on selected papers.

C4.

Language, Logic & Categories

SEMINAR
CONCEPTS (030082)
 PROF. ALBERT NEWEN

TERM:	Summer 2015
MEETING TIME:	Tuesday, 14.00 – 16.00 (First Meeting: April 7, 2015)
ROOM:	GA 03/46
CP:	4

To have a clear view on concepts is an important desire of philosophers and psychologists, at least for those who agree that concepts are the building blocks of thoughts, and that they enable us to develop our complex human reasoning. Concerning the nature of concepts, there are a lot of important questions to deal with: (i) How can or should we characterize minimal epistemic conditions of concept possession? (ii) Are concepts innate and, if yes, to which extent? (iii) Where is the borderline between non-conceptual representations and conceptual representations? (iv) Do animals possess concepts? (v) How can we best account for conceptual changes in the ontogenetic development of humans? (vi) Can concepts be characterized by a unitary informational structure?

Although we will discuss all these questions we want to focus on questions of the informational structure of concepts in humans. To discuss two main lines of research on concepts which can be characterized as empiricist and rationalist: Empiricist accounts of concepts claim that concepts can be fully analyzed in terms of a network of associated perceptual information (Barsalou 1999, Prinz 2004) while rationalist accounts of concepts argue that concepts are radically different in format from perceptual representations. The latter holds e.g. for Fodor's language of thought (Fodor 1975) but also for Dretske's theory of digital representations (Dretske 1983). To discuss further recent approaches of concepts in philosophy and psychology, we also will include relevant literature from the perspective of linguistics/semantic and developmental psychology (e.g. Susan Carey: *The origin of concepts*, 2011). A theory of concepts should furthermore account for *conceptual transformations* which take place during the ontogenetic development from 4 to 9 years of age (from characteristic-feature understanding to a definitional understanding of concepts).

The aim of the seminar is to discuss the best candidates of theories of concepts which can be used to explain the foundation of basic cognition, rationality and thinking in an interdisciplinary way.

C4.

Language, Logic & Categories

*SEMINAR***ADAPTIVE LOGICS (030088)**

DR. CHRISTIAN STRAßER

TERM:	Summer 2015
MEETING TIME:	Tuesday, 10.00 – 12.00 (First Meeting: April 7, 2015)
ROOM:	GABF 04/358
CP:	6

Adaptive logics offer a framework for the formal modeling of defeasible reasoning. When we reason defeasibly, our conclusions do not necessarily follow from our premises, but just likely or usually. One of the first applications of adaptive logics was reasoning on the basis of inconsistencies. The usefulness of Classical Logic is limited for this task since it allows one to derive just any formula when confronted with an inconsistent premise set. Inconsistency-adaptive logics, on the other hand, adapt themselves to a premise set in the following sense: they isolate inconsistencies and at the same time allow for the full power of Classical Logic for consistent parts of the premise set. The idea of letting a logic 'adapt itself to the premise set' has since been applied to many other forms of defeasible reasoning such as abductive reasoning (deriving explanations: think of Sherlock Holmes), inductive generalizations (to derive from 'some X are A' that 'all X are A'), normative reasoning in view of conflicting norms ('You shall not kill, but if you do, do it gently.'), default reasoning ('Tweety is a bird, thus she flies.'), and many others. In this seminar we will study adaptive logics, their dynamic proof theory, their semantics, and some of their applications. If time allows we will also investigate links to other central formal frameworks for defeasible reasoning. The literature will be announced in the first meeting. A basic understanding of propositional logic is advisory.

Consultation hour: Wednesday, 10:00 – 12:00 (please register)

C4.

Language, Logic & Categories

*SEMINAR***NORMATIVE REASONING AND DEONTIC LOGICS (030089)**

DR. CHRISTIAN STRAßER

TERM:	Summer 2015
MEETING TIME:	Thursday, 12.00 – 14.00 (First Meeting: April 9, 2015)
ROOM:	GABF 04/609
CP:	6

Deontic logic offers a formal explication of reasoning with normative notions such as obligations and permissions. It forms a subclass of modal logic. We start off with standard deontic logic which has the virtue of simplicity. However, it has its limitations. One such limitation concerns normative conflicts (for instance, when you make two promises that you cannot both fulfill), another one concerns conditional norms (for instance, think of a sign which says "Parents are allowed only if accompanied by children"). We will also study several alternative systems that were devised to tackle these problems, such as input/output logic, defeasible deontic logic, default logic, STIT-logic, etc. For the seminar no previous knowledge of modal logic is required though a basic understanding of propositional logic is advisory. Participants have the opportunity to familiarize themselves with central mechanisms in modal logic such as standard Kripkean relational (possible worlds) semantics and generalizations thereof such as neighborhood semantics. The literature will be announced in the first meeting.

Consultation hour: Wednesday, 10:00 – 12:00 (please register)

AM. Advanced Methods

Advanced methods are usually studied in the second semester. One exception is the "fMRI"-course which is only offered in the winter. Students who already have basic knowledge in cognitive neuroscience can choose to learn the "fMRI"-technique in the first semester. Necessary background: basic knowledge in cognitive neuroscience. The fMRI-seminar must be integrated into the course program during the first or the third semester; in the case you want to learn the fMRI –technique in the first semester, an individual application for the course is necessary: boris.suchan@rub.de.

The laboratory-class "Neural substrates of memory function" is a flexible whole day course that can be integrated whenever a student is free to do so; usually it only makes sense in the semester breaks. Further advanced methods can be found in the program from the last summer semester on our webpage: http://www.ruhr-uni-bochum.de/philosophy/mcs/program_courses.html. They will again be offered in the upcoming summer semester.

AM1.

Theory Formation and Conceptual Analysis

SEMINAR

ANIMAL COGNITION: WHAT MAKES US HUMAN? (030083)

PROF. ALBERT NEWEN

TERM:	Summer 2015
MEETING TIME:	Thursday, 10.00 – 12.00 (First Meeting: April 9, 2015)
ROOM:	GA 3/46
CP:	6

In the last two decades we have witnessed the emergence of radically new insights concerning the cognitive abilities of animals. Considering some new insights especially in birds, dogs and monkeys, we will discuss the recent candidates for an anthropological borderline between human and nonhuman animals. It is an open debate whether on the basis of significant examples we are able to accept one of the borderline candidates or whether we receive more support for the view that for all features (including the best candidates for an anthropological borderline) we find astonishing roots in nonhuman animals. If we account for the top-level abilities of the most advanced nonhuman species (including systematic training of the animals) the suggested borderline tends to be uninterestingly high because it excludes human children up to a certain age who are still lacking these abilities. If we account for a gradual and species-specific development of cognition in evolution and ontogeny (even with significant small steps), the best we can do to compare species is to develop species-specific profiles concerning relevant cognitive abilities. Comparing species would then take place by comparing these profiles while we should give up the idea that any one of the cognitive features alone would allow us to mark an anthropological borderline. The aim of the seminar is to discuss the recent philosophical and psychological theories about the relation between humans and animals. This will be done on the basis of reading the most important review papers about animal cognition.

Some relevant literature:

Kirstin Andrews: *The Animal Mind: An Introduction to the Philosophy of Animal Cognition*, 2014.

Michael Tomasello: *A Natural History of Human Thinking*, 2014.

Thomas Suddendorf: *The Gap: The Science of What Separates Us from Other Animals*, published by Basic Books 2013.

AM2.

Advanced Analysis of Language and Logic

LECTURE

EPISTEMIC LOGIC (030004)

PROF. HEINRICH WANSING

TERM:	Summer 2015
MEETING TIME:	Tuesday, 16.00 – 18.00 (First Meeting: April 7, 2015)
ROOM:	GA 3/143
CP:	6

Epistemic Logic is the logic of operators such as “agent a knows that”, “agent a believes that” (doxastic logic), “the group of agents G knows that”, and “it is common knowledge that”. Epistemic logic is or ought to be related to epistemology, the general philosophical theory of knowledge. In this introduction to epistemic logic we will first deal with some fundamental topics in epistemology, namely the problem of defining the notion of knowledge and approaches to the concept of epistemic justification. In a second step, the modal logic of knowledge and belief will be introduced. This approach is confronted with a number of problems referred to as problems of logical omniscience. In a third step, familiarity with the modal logic of knowledge will enable us to consider the so-called knowability paradox. This paradox has received much attention in the debate between realistic and anti-realistic conceptions of truth. Also, the notion of common knowledge will be introduced and discussed. Finally, the logical analysis of knowledge will be refined and brought in closer connection with general epistemology by considering so-call justification logics. These systems extend the logical analysis of knowledge by explicitly incorporating a formal representation of justification. We shall also look at dynamic epistemic logic, the study of modal logics of model change.

Credits can be obtained by passing an oral examination or writing an essay.

AM2.

Advanced Analysis of Language and Logic

*SEMINAR***COMPOSITIONALITY IN LANGUAGE, MIND AND BRAIN (030087)**

PROF. MARKUS WERNING AND DR. GUILLERMO DEL PINAL

TERM:	Summer 2015
MEETING TIME:	Thursday, 12.00 – 14.00 (First Meeting: April 9, 2015)
ROOM:	GA 04/187
CP:	6

Compositionality is a key concept in linguistics, the philosophy of mind and language, and throughout the cognitive sciences. Understanding how it works is a central element of syntactic and semantic analysis, and a challenge for models of cognition. In this seminar, we will read papers on the state of the art in all aspects of the subject from every relevant field. They reveal the connections in different lines of research, and highlight its most challenging problems and opportunities. The force and justification of compositionality have long been contentious. First proposed by Frege as the notion that the meaning of an expression is syntax-dependently determined by the meaning of its parts, it has since been deployed as a constraint on the relation between theories of syntax and semantics, as a means of analysis, and, more recently, as underlying the structures of representational systems such as mental concepts, computer programs and neural architectures. This seminar explores these and many other dimensions of one of the most exciting fields in the study of language and cognition.

Aside from active participation, participants will be expected to give a presentation in English. Assistance regarding the English language will be provided.

Literature

- Werning, M., Hinzen, W., & Machery, M. (Eds., 2012). *The Oxford Handbook of Compositionality*. Oxford: Oxford University Press.

AM3.

Behavior Studies

*LABORATORY-CLASS***NEURAL SUBSTRATES OF MEMORY FUNCTION (118159)**

PROF. MAGDALENA SAUVAGE

TERM: Summer 2015
MEETING TIME: 4-6 weeks (full time)
by arrangement; contact: [magdalena.sauvage@rub.de](mailto:magdalen.sauvage@rub.de)
CP: 7-10

The unit focuses on the identification of the brain areas that support memory function in healthy subjects, aging and model of amnesia. Several aspects of memory are studied: familiarity versus recollection, memory for single items versus pairs, memory for space versus time. We use a multidisciplinary approach of memory function that includes behavioral, lesion and neuroanatomical imaging techniques in rats and mice. The focus of the project is the study of the functional segregation of the medial temporal lobe, a brain structure damaged in aging and amnesic patients, which leads to severe memory impairments. The project involves the combination of behavioral and molecular imaging techniques. No previous experience is required, highly motivated candidates will be considered.

Examination:

Written Lab Report, Paper presentations

AM4.

Computational Modeling

*LECTURE & EXERCISE***MATHEMATICS FOR MODELING AND DATA ANALYSIS****(310503 & 310513)**

PROF. LAURENZ WISKOTT

TERM:	Summer 2015
LECTURE:	Thursday, 12.15 – 13.45 (First Meeting: April 9, 2015)
EXERCISE:	Thursday, 10.30 – 12.00 (First Meeting: April 16, 2015)
ROOM:	NB 3/57
CP:	6

This course covers mathematical methods that are relevant for modeling and data analysis. Particular emphasis will be put on an intuitive understanding as is required for a creative command of mathematics. The following topics will be covered: Functions, Hilbert-Spaces, matrices as, transformations, systems of linear differential equations, qualitative analysis of nonlinear differential equations, Bayes theory, multiple integrals.

AM5.

Molecular Imaging

*LABORATORY-CLASS***NEURAL SUBSTRATES OF MEMORY FUNCTION (118159)**

PROF. MAGDALENA SAUVAGE

TERM:	Summer 2015
MEETING TIME:	4-6 weeks (full time) by arrangement; contact: magdalena.sauvage@rub.de
CP:	7-10

The unit focuses on the identification of the brain areas that support memory function in healthy subjects, aging and model of amnesia. Several aspects of memory are studied: familiarity versus recollection, memory for single items versus pairs, memory for space versus time. We use a multidisciplinary approach of memory function that includes behavioral, lesion and neuroanatomical imaging techniques in rats and mice. The focus of the project is the study of the functional segregation of the medial temporal lobe, a brain structure damaged in aging and amnesic patients, which leads to severe memory impairments. The project involves the combination of behavioral and molecular imaging techniques. No previous experience is required, highly motivated candidates will be considered.

Examination:

Written Lab Report, Paper presentations

AM6.

EEG-training

SEMINAR & PRACTICAL COURSE
 ANGEWANDTE NEUROPSYCHOLOGISCHE METHODEN /
 ADVANCED EEG-ANALYSIS (118152, 118153, 118130)
 PROF. NIKOLAI AXMACHER

TERM:	Summer 2015
SEMINAR 1:	Monday, 8.00 – 10.00 (First Meeting: April 13, 2015)
LAB COURSE:	Monday, 12.00 – 14.00 (First Meeting: April 13, 2015)
SEMINAR 2:	Monday, 16.00 – 18.00 (First Meeting: April 13, 2015)
ROOM:	GAFO 05/609
CP:	6

Seminar 1

The seminar course stands in direct relation to the laboratory course with the same name (also 2 SWS). Participation in both modules is mandatory.

The goal is to relay the ability to develop further research questions in cognitive neuroscience based on published neuropsychological literature, and to develop, independently conduct, and analyze studies corresponding to these research questions. An additional goal is to acquire the ability to present the results in writing corresponding to the standards of neuroscientific journals. The course will be held in English.

Laboratory Course

The laboratory course stands in direct relation to the seminar course with the same name (also 2 SWS). Participation in both modules is mandatory.

The goal is to relay the ability to develop further research questions in cognitive neuroscience based on published neuropsychological literature, and to develop, independently conduct, and analyze studies corresponding to these research questions. An additional goal is to acquire the ability to present the results in writing corresponding to the standards of neuroscientific journals. The course will be held in English.

Seminar 2

In this seminar, we will discuss the book "Analyzing Neural Time Series Data: Theory and Practice" by Mike X Cohen. Students will be asked to present chapters from this book, and to apply the methods to data collected during the practical course.

I. Free Selection

Please notice that under the category "free selection" we only describe courses which are in German as additional offers. For the German speakers please notice that you are only allowed to have maximally three courses in German in the whole program. For all students including the English speaking students the following rule holds: All courses of the whole program can also be accepted in the module free selection, i.e. if you have completed (or you have a clear plan how to complete) the obligatory modules, you can choose whatever course supports you best to realize the optimal master thesis. Furthermore, we can in principle accept also internships up to 10 credit points in the category of free selection. The internship must of course be equivalent to the number of credit points and it must be an internship that is proven to qualify for the program "Cognitive Science" and ideally supports the master thesis. If you aim to use an internship as a way to complete a part of this module then please contact Dr. Brössel or Prof. Newen in advance.

D1.

Free Selection

VORLESUNG
KOGNITION UND GEHIRN (112611)
 PROF. OLIVER WOLF

TERM:	Summer 2015
MEETING TIME:	Monday, 14.00 – 16.00 (First Meeting: April 13, 2015)
ROOM:	HGA 30
CP:	3

Die Vorlesung ist für Studierende ab dem 4. Semester geeignet. Sie bietet einen Überblick über Befunde und Theorien zu aktuellen Themen der kognitiven Neurowissenschaft. Die Vorlesung setzt Grundkenntnisse der Kognitionspsychologie und der Biopsychologie voraus, die bis zum 4. Semester vermittelt werden. Kenntnisse aus dieser Vorlesung werden im Master Studiengang Psychologie und Kognitive Neurowissenschaft vorausgesetzt.

D1.

Free Selection

*LECTURE***KOGNITIVE NEUROWISSENSCHAFT DES GEDÄCHTNISSES (118128)**

PROF. NIKOLAI AXMACHER

TERM:	Summer 2015
MEETING TIME:	Wednesday, 10.00 – 12.00 (First Meeting: April 15, 2015)
ROOM:	GAFO 02/364
CP:	t.b.a.

Vorlesung zur Kognitiven Neurowissenschaft des Gedächtnisses. Die kritische Auseinandersetzung mit den Lerninhalten in Form von Diskussionen ist ein zentrales Lernziel und geht in die Bewertung mit ein.

D1.

Free Selection

*SEMINAR***DISKURS DER NEUROPSYCHOLOGIE (118163)**

PROF. NIKOLAI AXMACHER

TERM:	Summer 2015
MEETING TIME:	Thursday, 10.00 – 12.00 (First Meeting: April 16, 2015)
ROOM:	GAFO 05/609
CP:	t.b.a.

Hier wird der intensive Austausch über ein vorgegebenes Forschungsthema in einer kleinen Gruppe ermöglicht. Ein wichtiger Aspekt ist auch die Einladung und Betreuung von Gastrednern und die Teilnahme am wissenschaftlichen Vortrag. Die kritische Auseinandersetzung mit den Lerninhalten in Form von Diskussionen ist ein zentrales Lernziel und geht in die Bewertung mit ein.

D1.

Free Selection

*COMPACT COURSE***EMOTIONEN UND EMOTIONSREGULATION (112914)**

DR. MAREL MEYER

TERM:	Summer 2015
MEETING TIME:	Thursday, April 9, 16.00 – 18.00, Room GAFO 02/368 Tuesday, April 26, 10.00 – 17.00, Room GAFO 04/425 Wednesday, May 27, 10.00 – 17.00, Room GAFO 04/425 Thursday, May 28, 10.00 – 17.00, Room GAFO 04/425
CP:	t.b.a.

Dieser Kurs bietet eine Einführung in die Themenbereiche Emotionen und Emotionsregulation. Neben klassischen Theorien aus diesen Forschungsgebieten, werden neuere empirische Befunde vorgestellt und diskutiert. Hierbei werden relevante Studien der Experimentalpsychologie, der Klinischen Psychologie sowie aus den kognitiven Neurowissenschaften herangezogen. Die Seminarleistung wird überwiegend durch Referate erbracht werden. Das Seminar findet als 3tägiger Blockkurs in den Pfingstferien (26.5.-28.5.) ganztägig statt (10-17 Uhr). Eine Vorbesprechung zur Verteilung der Referate erfolgt am 9.4. um 16h in GAFO 02/368. Bitte melden Sie sich nur an, wenn Sie zu allen Tagen anwesend sein können. Das Seminar ist geeignet für alle Bachelorstudenten der Fakultät für Psychologie.

Literatur: Gross, J.J. (Ed.) (2014). Handbook of emotion regulation (2nd ed.). New York, NY: Guilford.

D1.

Free Selection

*COMPACT COURSE***DUFTE EMOTIONEN – VON DER GERUCHSWAHRNEHMUNG ÜBER
DIE GERUCHSVERARBEITUNG ZU EMOTIONEN (112913)**

ANNE-KATHRIN BESTGEN

TERM:	Summer 2015
MEETING TIME:	Friday/Saturday, 9.00 – 18.00 (First Meeting: April 17, 2015)
ROOM:	GAFO 04/271
CP:	t.b.a.

In dem Seminar erwartet die Teilnehmer eine Einführung in die Geruchswahrnehmung und Geruchsverarbeitung (Von der Biologie bis zur Psychologie). Des Weiteren erhalten die Teilnehmer einen Einblick in den aktuellen Forschungsstand der Fakultät zur Geruchsforschung mit einer Einbettung in den Kontext Emotionen. Die Teilnehmer bearbeiten und stellen aktuelle Forschungsthemen vor und üben sich an der Konzipierung eigener Studienideen und der Versuchsplanung in Zusammenhang mit ihrer vorgestellten Thematik. Die Seminarleistung wird überwiegend durch Kurzvorträge erbracht. Das Seminar findet als Blockkurs an 3 Tagen, ganztägig statt: Freitag 17.4., Freitag 24.4., Samstag 25.4.

D1.

Free Selection

*SEMINAR***LERNEN UND PROBLEMLÖSEN (030268)**

PROF. NIKOL RUMMEL

TERM:	Summer 2015
MEETING TIME:	Thursday, 10.00 – 12.00 (First Meeting: April 9, 2015)
ROOM:	GABF 05/703
CP:	4

Die Fähigkeit Probleme zu lösen wird als eine der Schlüsselkompetenzen für die Bewältigung von Anforderungen im beruflichen wie privaten Alltag angesehen. Entsprechend stellt sich die Frage, wie eine solche Problemlösefähigkeit zu vermitteln ist. Gleichzeitig wird Problemlösen als Instruktionsmethode genutzt. Dadurch stellt sich die Frage nach dem Zusammenspiel von Problemlösen und Lernen. In dem Seminar wird zunächst auf theoretischer Basis die Fähigkeit zum Lernen definiert; anschließend werden verschiedene Formen des Lernens kontrastiert. Der zweite Teil der Veranstaltung beschäftigt sich mit dem Konzept des Problemlösens. Schließlich werden Lernen und Problemlösen einander gegenübergestellt. Abschließend werden spezifische Situationen, in denen Lernen und Problemlösen stattfinden betrachtet und die damit einhergehenden Möglichkeiten bzw. Herausforderungen diskutiert.

Anforderungen für einen kleinen Studiennachweis: Lektüre ausgewählter Texte und Bearbeitung von kleinen Aufgaben zur Vorbereitung der Sitzungen; aktive Mitarbeit; Klausur.

Die Gesamtnote konstituiert sich aus einer individuell und schriftlich zu erbringenden Leistung, deren Form von der/dem Lehrenden festgelegt wird. Darüber hinaus werden weitere, jedoch unbenotete Leistungen verlangt.

D1.

Free Selection

*LECTURE***EVOLUTION UND EMOTION (112251)**

PROF. ONUR GÜNTÜRKÜN

TERM:	Summer 2015
MEETING TIME:	Thursday, 16.00 – 18.00 (First Meeting: April 9, 2015)
ROOM:	HGA 10
CP:	3

Wie verlief bisher die Geschichte des Lebens? Innerhalb welchen Gesamtszenarios bettet sich die Entstehung des Menschen ein und welche Anteile unseres heutigen Denkens, Handelns und Fühlens reflektieren die Gesetzmäßigkeiten, die bei der Phylogenese unseres Gehirns wirksam waren? Wie determiniert die Interaktion von Umweltfaktoren und genetischer Anlage unsere kognitiven Leistungen? Um solche Fragen beantworten zu können, müssen wir die Evolutionstheorie mit allen ihren Implikationen kennenlernen. In der Vorlesung sollen folgende Themen behandelt werden:

- 1) Mechanismen der Genetik.
- 2) Entwicklung des Lebens und des Menschen.
- 3) Emotionsmechanismen.
- 4) Soziobiologie.

Literatur:

Bekanntgabe der aktuellen Literatur während der Veranstaltung und über Blackboard.

D1.

Free Selection

*LECTURE***BIOPSYCHOLOGIE (112631)**

PROF. ONUR GÜNTÜRKÜN

TERM:	Summer 2015
MEETING TIME:	Thursday, 12.00 – 14.00 (First Meeting: April 9, 2015)
ROOM:	GAFO 03/252
CP:	3

Das Wissen um Hirnaufbau und Hirnfunktion ist die Grundlage für das Verstehen sämtlicher bio- und neuropsychologischer Fragestellungen. In dieser Vorlesung wollen wir uns exemplarisch das Sehsystem des Menschen vornehmen. Wir wollen seine Funktionen verstehen, indem wir die Anatomie und Physiologie des Sehsystems kennenlernen und neuropsychologische Ausfälle anschauen. Danach wollen wir kennenlernen, wie die visuelle Information in die Prozesse des präfrontalen Cortex integriert wird, so dass die Fähigkeit zum Behalten, Planen und Handeln entsteht. Kurz gesagt, wollen wir die neuralen Grundlagen des Wahrnehmens und Erkennens kennenlernen.

Literatur:

Onur Güntürkün, Biopsychologie, Hogrefe Verlag 2012, Kapitel 5 - 12

Bekanntgabe weiterer aktueller Literatur während der Veranstaltung und über Blackboard.

Dieser Kurs kann auch im Modul Advanced Methods anerkannt werden:

D1.

Free Selection

*EXERCISE & COMPACT COURSE***PROGRAMMIEREN IN MATLAB (118155)**

ROLAND PUSCH & SARAH STAROSTA

TERM:	Summer 2015
MEETING TIME:	Thursday, 16.00 – 18.00 (First Meeting: April 9, 2015) additional compact course (weekend)
ROOM:	GAFO 04/615
CP:	6

In dem Projektseminar nehmen die Studenten an einem Forschungsprojekt teil und gewinnen hierbei Einblick in die Versuchsdurchführung, Datenanalyse und -interpretation. Im Vordergrund steht dabei die Einführung in die Programmierung mit Matlab, die in wöchentlichen Sitzungen stattfinden und von zeitintensiven Hausaufgaben begleitet sein wird. Zusätzlich werden die Studenten Verhaltensversuche durchführen und diese dann mit ihren neu gewonnenen Programmierkenntnissen in Matlab auswerten. In einem separaten Blocktermin werden die Studenten das Projekt auch inhaltlich erarbeiten. Am Ende sollen alle drei Aufgabenbereiche in einem Bericht zusammenlaufen, in dem die inhaltlichen Aspekte des Projekts, die erhobenen Daten und deren Auswertung beschrieben werden.

Rückfragen bitte an: Roland.Pusch@rub.de/ Sarah.Starosta@rub.de.

Dieser Kurs kann auch im Modul Advanced Methods anerkannt werden:

D1.

Free Selection

*SEMINAR***DAS MENSCHLICHE GEHIRN - EIN MAL- UND BASTELKURS
(112241-50)**

KLOSE, STRÖCKENS, FAUSTMANN

TERM:	Summer 2015
MEETING TIME:	Friday, 14.00 – 16.00 (First Meeting: April 10, 2015)
ROOM:	t.b.a.
CP:	6

Bei diesem Seminar handelt es sich um eine etwas ungewöhnliche Veranstaltung. Durch gestalterisches Arbeiten mit künstlerischen Hilfsmitteln sollen nicht nur die Gestalt, Struktur und Anatomie des Gehirns erlernt werden, sondern auch die physiologischen und biopsychologischen Eigenschaften, Leistungen und Aufgaben der unterschiedlichen Hirnareale. Zudem werden die behandelten Hirnstrukturen und deren Aufgabe im Institut für Anatomie an realen Gehirnen wiederholt und vertieft. Die Benotung erfolgt anhand einer Abschlussklausur und der in den Referaten erzielten Note; Voraussetzung für die Klausur: aktive Mitarbeit und ein Referat.

SECOND YEAR PROGRAM

I. Interdisciplinary Research Module

Usually the interdisciplinary research modules should be completed in the third semester (winter semester). To keep flexibility for the students we offer some courses for these modules in the summer semester as well. Please check individually with the lecturer whether the colloquium will be in English. If the announcement is in English it is in English. But even if the announcement is in German the course may be in English because the literature discussed is in English.

17.

Cognitive Philosophy

COLLOQUIUM

**PHILOSOPHY MEETS COGNITIVE SCIENCE:
INVESTIGATING MIND AND LANGUAGE (030129)**
PROF. MARKUS WERNING

TERM:	Summer 2015
MEETING TIME:	Thursday, 16.00 – 18.00 (First Meeting: see http://www.ruhr-uni-bochum.de/phil-lang/colloquium.html)
ROOM:	GA 04/187
CP:	6

In the research colloquium current topics at the interface between Philosophy and Cognitive Science will be discussed. The colloquium hosts talks by visiting leading experts and local researchers as well as presentations by doctoral and master students. Students will be given the (assisted) opportunity to present their projects in English.

12.

Cognitive Psychology

SEMINAR
JOURNAL CLUB (118915)
PROF. NIKOLAI AXMACHER

TERM: Summer 2015
MEETING TIME: Thursday, 16.00 – 18.00
(First Meeting:
see <http://www.ruhr-uni-bochum.de/neuropsychy/lehre.html>)
ROOM: GAFO 05/609
CP: t.b.a.

In Analogie zu den Kognitiven Neurowissenschaften - der Untersuchung der neuronalen Korrelate kognitiver Prozesse - wurden in den letzten Jahren auch Konzepte der Psychoanalyse mit bildgebenden Methoden untersucht. Dieses Seminar vermittelt einen Überblick über diese Studien. Dabei werden aktuelle Untersuchungen zu zentralen psychoanalytischen Konzepten (Verdrängung, Konversion, Träume, Traumatisierung...), aber auch Studien zu den Mechanismen der psychodynamischen Psychotherapie sowie psychodynamische Konzeptualisierungen neuropsychologischer Symptome vorgestellt und diskutiert. Die kritische Auseinandersetzung mit den Lerninhalten in Form von Diskussionen ist ein zentrales Lernziel und geht in die Bewertung mit ein.

12.

Cognitive Psychology

SEMINAR

RESEARCH COLLOQUIUM GENETIC PSYCHOLOGY (118911)

PROF. ROBERT KUMSTA

TERM:	Summer 2015
MEETING TIME:	please consult http://www.gen-psych.ruhr-uni-bochum.de/teaching/index.html.en
ROOM:	GAFO 04/425
CP:	t.b.a.

Dieses Forum dient zur Vorstellung aktueller Forschungsprojekte und Qualifikationsarbeiten (Bachelorarbeiten, Masterarbeiten, Promotionsprojekte) der Arbeitseinheit Genetic Psychology. Darüber hinaus werden eingeladene Wissenschaftler aktuelle Forschungsbefunde zur Genetik, Epigenetik und Entwicklungspsychobiologie präsentieren. Ein Zeitplan mit Information über Themen und Referenten wird zu Beginn des Semesters per Aushang und auf der Homepage bekannt gegeben.

COLLOQUIUM

RESEARCH COLLOQUIUM NEUROPSYCHOLOGY (118912)

PROF. NIKOLAI AXMACHER

TERM:	Summer 2015
MEETING TIME:	Thursday, 14.00 – 16.00 (First Meeting: see http://www.ruhr-uni-bochum.de/neuropsy/lehre.html)
ROOM:	GAFO 05/609
CP:	t.b.a.

Vorstellung laufender Forschungsarbeiten, sowie Vorträge von Gastdozenten zu klinisch-neuropsychologischen Themen. Ein Zeitplan mit Information über Themen und Referenten wird zu Beginn des Semesters per Aushang und auf der Homepage bekannt gegeben. Die kritische Auseinandersetzung mit den Lerninhalten in Form von Diskussionen ist ein zentrales Lernziel und geht in die Bewertung mit ein.

COLLOQUIUM

RESEARCH COLLOQUIUM BIOPSYCHOLOGY (118914)

PROF. ONUR GÜNTÜRKÜN

TERM:	Summer 2015
MEETING TIME:	Monday, 13.00 – 15.00 (First Meeting: see http://www.bio.psy.ruhr-unibochum.de)
ROOM:	GAFO 05/425
CP:	t.b.a.

The research colloquium is open to all employees and graduate students of the Biopsychology department. The Aim is to present and discuss their research. In addition external guests are invited to give talks on different aspects of biopsychology. You can have a look at the schedule at the department's information board and our homepage: <http://www.bio.psy.ruhr-unibochum.de/>