

# Course Guide – Master Cognitive Science

Winter 2018/19

05.10.2018

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## ATTENTION: LECTURE AND EXERCISE ARTIFICIAL NEURAL NETWORKS BY PROF. DR. ROLF WÜRTZ HAVE BEEN CANCELLED!!!!

### 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](mailto: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.

### FIRST YEAR PROGRAM

Every student is strongly recommended to participate in the preparatory courses. Exceptions have to be approved by Dr. Pascale Willemsen ([Pascale.Willemsen@rub.de](mailto:Pascale.Willemsen@rub.de)) or by Prof. Dr. Albert Newen ([albert.newen@rub.de](mailto:albert.newen@rub.de)). The course "Academic English" need not be passed by native speakers of English. The course "Biostatistics" need not be passed by students who have a standard BA in psychology.

### Preparatory Courses

#### Biostatistics

*SEMINAR*  
**BIostatISTICS (119 212)**  
JAMOL BAHROMOV

**TERM:** Winter 2018/19  
**MEETING TIME:** September 21 – October 5: 11.00 – 14.30  
**ROOM:** GA 1/128 ("CIP-Insel")

"Biostatistics" will cover the basic statistical methods used by researchers in the life sciences to collect, summarize, analyze, and draw conclusions from data. The topics include descriptive statistics, univariate statistical tests, and experimental design.

## Academic English

*SEMINAR*

**ENGLISH FOR MASTER COGNITIVE SCIENCE (251 211)**

ANNA SOLTYSKA

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	September 21 – October 5, 8.30 – 10.30
<b>ROOM:</b>	SH 1/101a

This course takes into account the particular needs of the students of the Master Program in Cognitive Science and covers all competencies that are necessary to study in English. It focuses on productive skills that will be practiced by means of discussions and short presentations on study-related issues. Using a task-based approach, listening, reading, writing and speaking skills will be trained intensively and social and intercultural competencies will be included as well. Authentic lectures and academic texts on chosen topics related to philosophy, psychology

and neuroscience will be used throughout the course.

The course will be accompanied by a Blackboard/Moodle component to enhance classroom teaching and self-study at home.

At the end of the course the participants have to write a final test that will comprise all four skills taught in class.

Literature: Materials compiled from a variety of sources will be used.

## Mathematical Skills

*SEMINAR*

**MATHEMATICS AND COMPUTERSCIENCE FOR MODELING (???)**

JAN TEKÜLVE

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	September 21 – October 5: 15.30 – 17.00
<b>ROOM:</b>	GA 1/128 ("CIP-Insel")

The "Informatics and Mathematics" preparatory course will combine a hands-on introduction to programming in python with a revision of elementary mathematical concepts. The topics include data types, data structures, control structures and data visualisation on the programming

side and they will be applied to vector/matrix calculation, integration/differentiation of functions and differential equations.

# A1. Introduction to Cognitive Science

## A1.

A1. Introduction to Cognitive Science

***OBLIGATORY FOR EVERY FIRST YEAR STUDENT***

*LECTURE & SEMINAR*

**INTRODUCTION TO COGNITIVE SCIENCE (LECTURE 030 007)**

PROF. ALBERT NEWEN, PROF. MARTIN BRÜNE,  
PROF. ONUR GÜNTÜRKÜN, PROF. NIKOLAI AXMACHER,  
PROF. NIKOL RUMMEL, PROF. SARAH WEIGELT  
PROF. TOBIAS SCHLICHT, PROF. GREGOR SCHÖNER,  
PROF. LAURENZ WISKOTT, PROF. SEN CHENG

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Wednesday, 10 – 12 (First Meeting: 10.10.2018)
<b>ROOM:</b>	GA 04/187
<b>SEMINAR:</b>	Wednesday, 12 – 14 (First Meeting: 17.10.2018)
<b>ROOM:</b>	GABF 04/511 / last three meetings: NA 04/494
<b>CP:</b>	6

### Attention:

- The time of the lecture will not vary but the time of the seminar will vary somewhat: The details of the seminar plan will be announced later.
- Lecture and Seminar #14 take place in LWL-Universitätsklinik Bochum, Alexandrinenstraße 1, 44791 Bochum

The lecture introduces the interdisciplinary field of cognitive science in combining philosophy, psychology, computational modeling and neurosciences. The course has the aim to deliver important basic knowledge from empirical sciences in the framework of theory formation. The credit points are delivered on the basis of a written examination and of some active work in the obligatory additional seminar.

### The structure of the lecture:

1. Introduction: History of Cognitive Science
- 2 Basic Concepts in Cognitive Science
- 3 Cognitive Neuroscience of Perception
- 4 Modeling Vision
- 5 Consciousness of Perception
- 6 Development of Vision
- 7 Enacted and Embodied Cognition
- 8 Models of Motor Control
- 9 Cognitive Neuroscience of Emotion
- 10 Theories of Emotion
- 11 Psychology of Learning
- 12 Cognitive Neuroscience of Memory
- 13 Models of Learning and Memory
- 14 Social Cognition: Evolution, Development, Pathology

## BM. Basic Methods

Students are expected to learn (at least) three out of four basic methods: If you have a BA in psychology, you can skip the “Experimental Psychological Lab” but have to pass the three other basic methods. If you have a BA in philosophy you can skip the course “Logic” but have to learn the other three methods. Some with a BA in neuroscience can skip method BM 4. All the other students need to study all basic methods. Exceptions can be made if someone can prove to have already studied the content of a course but need explicit approval by Dr. Pascale Willemsen ([Pascale.Willemsen@rub.de](mailto:Pascale.Willemsen@rub.de)) or by Prof. Dr. Albert Newen ([albert.newen@rub.de](mailto:albert.newen@rub.de)).

### BM1.

#### BM1. Experimental Psychology Lab

*SEMINAR*

**EXPERIMENTAL PSYCHOLOGICAL LAB (119 213)**

DR. SIMON E. BLACKWELL

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday 12 – 14 (First meeting: 11.10.2018)
<b>ROOM:</b>	IA 1/163.
<b>CP:</b>	6

The Experimental Psychology Lab course aims at introducing the principles of experimental psychology. The participants will learn how to plan and conduct own experimental studies, and how to analyze the data.

As a result, all participants will write a first scientific report. The lab course will be held in small groups.

*SEMINAR***LOGIC AND PHILOSOPHICAL METHODOLOGY (030064)**

JUN. PROF. PETER BRÖSSEL

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 14 – 16 (First meeting: 09.10.2018)
<b>ROOM:</b>	GABF 04/609
<b>CP:</b>	4

The aim of this course is to provide an overview of the fundamental philosophical methods relevant for theory construction in cognitive science and in philosophy. Students will acquire (i) basic competences in classical logic and probability theory, (ii) an introduction to methods of concept clarification such as conceptual analysis, explication, and explicit and implicit definitions and (iii) insights into the basics of constructing, testing, and revising theories and models within cognitive science and philosophy. A part of the course will be devoted to practical exercises to consolidate the acquired competencies. A precondition for receiving ECTS points is 1.) to submit weekly homework regularly and 2.) to pass the written exam at the end of the course. The ECTS points can be with or without grade (dependent on the amount of work).  
Literatur:

Theodor Sider, *Logic for Philosophy*, Oxford University Press, 2010.

Volker Halbach: *The Logic Manual*, Oxford University Press, 2010.

## General Remark Concerning BM3 – Neural Networks

A basic course in neural networks is obligatory. The course of Prof. Cheng is the standard course for the students in Cognitive Science. If you are coming with more background in mathematics you feel free to choose other offers. Students only have to pass one course in BM3.

# BM3.

BM3. Neural Networks

SEMINAR

**COMPUTATIONAL COGNITIVE MODELING (310 024)**

PROF. SEN CHENG

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 14-16 (First Meeting: 19.10.2018)
<b>ROOM:</b>	NB 3/57
<b>CP:</b>	3 Max. 20 students

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.

**Prerequisites:** Basic knowledge of cognition e.g., “Cognition I + II”, “Learning”.

**Assessment:** Presentation in class

**Course material:** Moodle (sign-up required)

**Textbook:** “The Cambridge Handbook of Computational Psychology” edited by Ron Sun, Cambridge University Press  
+ modeling papers announced in class

**Contact:** Prof. Sen Cheng, NB 3/33,  
sen.cheng@rub.de

*LECTURE & EXERCISE***COMPUTATIONAL NEUROSCIENCE – NEURAL DYNAMICS****(310 001 & 310 011)**

PROF. GREGOR SCHÖNER

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Thursday, 14 – 16 (First Meeting: 11.10. 2018)
<b>ROOM:</b>	NB 3/57
<b>EXERCISE:</b>	Thursday, 16.15 – 17.00 (First Meeting: 18.10.2018)
<b>ROOM:</b>	NB 3/57
<b>CP:</b>	6

This course provides an introduction into the theoretical behavioral and functional neurosciences from a particular theoretical vantage point, the dynamical systems approach. This approach emphasizes the evolution in time of behavioral and neural patterns as the basis of their analysis and synthesis. Dynamic stability, a concept shared with the classical biological cybernetics framework, is one cornerstone of the approach. Instabilities (or bifurcations) extend this framework and provide a basis for understanding flexibility, task specific adjustment, adaptation, and learning.

The course will include tutorial modules that provide mathematical foundations. Theoretical

concepts will be exposed in reference to a number of experimental model systems which will include the coordination of movement, postural and configurational stability, the perception of motion, and elementary forms of spatial cognition. In the spirit of Braitenberg's "synthetic psychology", autonomous robots will be used to illustrate some of the ideas.

Exercises will be integrated into the lectures. They will consist of elementary mathematical exercises, the design of (thought) experiments and their analysis, and the design of simple artificial systems, all on the basis of the theoretical framework exposed in the main lectures.



*LECTURE***CLINICAL NEUROPSYCHOLOGY (112 621)**

PROF. BORIS SUCHAN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 10.00 – 12.00 (First Meeting: 09.10.2018) Exam: Wednesday, 20.03.2019, 10-12, HIA
<b>ROOM:</b>	IAFO 02/445
<b>CP:</b>	3

Aim of this lecture is to get an insight in the organization of the human brain, functional neuroanatomy and neuropsychology. Starting with an overview of basic methods used in neuroscience, the full brain starting at the occipital lobe and ending at the frontal lobe will be explored with respect to its functional organization. Beside functional organization, neuropsychological syndromes like neglect apraxia and amnesia will be discussed.

## Literature:

Kolb & Wishaw: Fundamentals in human neuropsychology.

K.M. Hellmann & E. Valenstein (1993). Clinical Neuropsychology: Oxford University Press.

## C. Topics Selection

# C1.

Social Cognition & Meta-Science

*SEMINAR*

**EMBODIED COGNITION (030090)**

DR. REGINA FABRY

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 16 – 18 (First Meeting: 08.10.2018)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	6

According to traditional views in philosophy of cognition and the cognitive sciences, cognitive processes are constituted by computations over mental representations that are implemented in the human brain. Accounts of embodied cognition challenge this view and propose that the extra-cerebral body plays a crucial role in cognitive processes. This proposal also forces our embodied engagements with our local environment into picture, which has been neglected by traditional accounts of cognition.

In this seminar, we will delve into current debates on embodied cognition with a particular emphasis on research on the embodied dimension of language production and comprehension. We will discuss the implications of work on embodied cognition for philosophical and empirical research in the cognitive sciences.

Literature:

Adams, F. (2010). Embodied cognition. *Phenomenology and the Cognitive Sciences*, 9(4), 619–628.

Anderson, M. L. (2003). Embodied cognition: A field guide. *Artificial Intelligence*, 149(1), 91–130.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, 9(4), 625–636

## SEMINAR

**PHILOSOPHICAL THOUGHT EXPERIMENTS AND EXPERIMENTAL PHILOSOPHY (030 083)**

PASCALE WILLEMSSEN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday 14-16 (First Meeting: 11.10.2018)
<b>ROOM:</b>	GA 03/46
<b>CP:</b>	6

Jackson's Mary, Wittgenstein's Beetle in a Box, Searle's Chinese Room, Nozick's Experience Machine, Frankfurt Cases, philosophical zombies, Twin Earth, and most famously the Trolley Problem – the list of philosophical thought experiments seems sheer endless. Philosophical thought experiments are cases in which the reader is invited to make a series of philosophical assumptions about the world and to consult her or his intuitions about these cases. From these intuitions, philosophical conclusions about different concepts such as knowledge, freedom, moral responsibility, etc. are drawn. Building philosophical arguments on intuitions about thought experiments has recently been called the "Method of Cases".

Many philosophers and also empirically-oriented researchers have heavily criticized the Method of Cases from various angles. One of the main challenges comes from the new movement of experimental philosophy. Experimental philosophy is a new empirical method that systematically investigates laypeople's intuitions on philosophical questions and problems, among others the aforementioned philosophical thought experiments. Strikingly, it could be shown that laypeople very often do not share philosophers' intuition nor are these intuitions stable. Rather, intuitions can be easily pushed-around. But why should laypeople's intuitions even matter for philosophy? But since when do researchers consult the general public to build their theories?

In this seminar, we will discuss the relevance of philosophical thought experiments, the recent challenges of experimental philosophy, and how these two methods relate to one another. The seminar will strongly rely on Edouard Machery's book "Philosophy Within Its Proper Bounds" (2017) and it will be enriched by both traditional philosophical papers, and more recent experimental ones. Occasionally, there will be special guest lectures during the seminar.

*BLOCKSEMINAR***SKILLFUL ACTION (030 076)**

PROF. ALBERT NEWEN, JUDITH MARTENS

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	12.10.: 10.15 – 11.45 26.10., 9./16./30.11., 14.12.: 10 – 14
<b>ROOM:</b>	***t.b.a.
<b>CP:</b>	6

When we tune in to the Olympics once every four years to watch the best athletes in the world, each of these athletes is extremely skilled. But what exactly comprises their skill? What do they know and do in order to compete at this level? How are they able to translate their knowledge into actions? Research on skillful actions combines (i) philosophical debates of the relation of knowing how and knowing that with (ii) psychological research on the cognitive foundations of skillful actions. Thus, in this block seminar we will discuss some of the key approaches and distinctions within the literature on skillful action that help us answer the questions above by integrating a philosophical and psychological perspectives. The topics that we will discuss include:

- Know-how (and know-what)
- Dreyfus's anti-intellectualism
- Stanley's intellectualism
- In-between intellectualism and anti-intellectualism: three levels of control (Fridland, Christensen and colleagues)
- Skill acquisition
- The role of memory in skillful action

Demands for certificates: Students have to be present at the introductory meeting. Furthermore, to receive a certificate, each student has to read to texts per session and send in one research question per week in moodle as a minimal background activity. Furthermore, for an ungraded certificate each student has either to deliver a Power-Point Presentation of one text or to write a short essay (details in the introductory session). A graded certificate presupposes a presentation of one text plus a written long essay (details in the introductory session).

Preparatory Reading: „Knowledge how“ in Stanford Encyclopedia of Philosophy: <https://plato.stanford.edu/entries/knowledge-how/>

**C1.**

Social Cognition &amp; Meta-Science

*SEMINAR***FROM DRETSKE TO PREDICTIVE CODING: NATURALISTIC APPROACHES TO INFORMATION AND MENTAL REPRESENTATION (030070)**

PROF. TOBIAS SCHLICHT, KRZYSZTOF DOLEGA

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 12 – 14 (First Meeting: 09.10.2018)
<b>ROOM:</b>	GA 3/143
<b>CP:</b>	6

The mathematical theory of communication proposed by Claude Shannon in 1948 has been the foundation for some of the biggest technological achievements of the 20th century. Its impact has been crucial to the success of the Voyager space missions, the invention of the compact disc and digital file compression, the feasibility of mobile phones, and even the development of the internet. It is safe to say that without Shannon information our everyday lives would look very different than they do right now.

However, despite the importance of information theory philosophers have not paid much attention to it for many years. It wasn't until 1981 and Fred Dretske's seminal work 'Knowledge and the Flow of Information' that information theory has received proper attention from philosophers of mind. In his book, Dretske attempted to use Shannon's notion of information to build a naturalistic and objective account of how perception can deliver knowledge about the world. By defining the notion of mental representation in information theoretic terms, Dretske started a new chapter in the philosophy of mind. Over the years his account, supplemented by evolutionary considerations by Ruth Millikan, has become one of the default explanations of mental content. Even today, this construal of mental representation is one of the central topics of many discussions. As new research programs, such as radical embodied cognition and predictive coding, emerge, the debate over the notion of representation as information is once again a hotly debated topic. The aim of this seminar is to familiarize the students with Shannon's notion of information and show how it has been applied in philosophy of mind. Special focus will be given to recent critiques of this notion, aiming to answer the question, whether 'new' approaches are indeed substantially different from what has been proposed by established figures like Dretske.

## SEMINAR

**MORAL MOTIVATION (030084)**

PASCALE WILLEMSSEN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 10 – 12 (First Meeting: 11.10.2018)
<b>ROOM:</b>	GA 03/46
<b>CP:</b>	6

In addition to the normative-ethical questions of how we should act, psychologists, cognitive scientists, and philosophers have started to systematically investigate how we do act in morally relevant situations. Experimental evidence indicates that whether we act morally or not strongly depends on situational factors; it depends on whether we are in a hurry, something fortunate recently happened to us, on whether we are hungry or not, and on whether we think that someone is watching us. But moral behaviour should not depend on these contingent factors, right? It is this discrepancy between the 'ought' and the 'is' that motivates this seminar.

In this interdisciplinary course, we will cover a variety of normative-ethical theories on how we should act, and we will read recent empirical studies that have challenged whether these theories have any real-life applicability. Spoiler alert: things don't look so promising! But perhaps things are just much more complicated than philosophers have thought. Perhaps we are just not perfectly ethical or not committed to one specific ethical theory. It still seems that there is something in us that motivates to act morally; this inner voice that makes us cry out in the face of injustice. What is that voice? What are the evolutionary explanations of moral behaviour and cooperation? And what happens if people lack this inner voice entirely?

These are just some of the issues that will be dealt with in this seminar. It is recommended but not necessary that students have some background in ethics, metaethics, or philosophy of mind or action. The language of instruction is English.

We will mainly read modern, theoretical and empirical papers or individually selected book chapters. Some of these texts will be taken from the following books which are a perfect background reading:  
Alfano, M. (2016): *Moral Psychology: An Introduction*. Polity.  
Doris, J. (2012): *The Moral Psychology Handbook*. Oxford University Press.  
Tiberius, V. (2014): *Moral Psychology: A Contemporary Introduction*. Routledge.

**CANCELLED***LECTURE & EXERCISE***ARTIFICIAL NEURAL NETWORKS (310 002 & 310 012)**

PD DR. ROLF WÜRTZ

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Friday, 12 – 14 (First Meeting: 12.10.2018)
<b>ROOM:</b>	HZO 100
<b>EXERCISE:</b>	Wednesday, 14 – 18 (1 hour groups), (First Meeting: 17.10.2018)
<b>ROOM:</b>	NA 5/99
<b>CP:</b>	5

This lecture presents standard algorithms and new developments of feedforward Artificial Neural Networks, their functioning, application domains, and connections to more conventional mathematical methods. Examples show the potential and limitations of the methods. Supervised as well as unsupervised learning methods are introduced. In detail:

- 1) Introduction, some biological facts
- 2) Mathematical foundations: probability theory and partial derivatives
- 3) One layer networks and linear discriminants
- 4) Multilayer networks and error backpropagation

- 5) Universality of two-layer networks
- 6) Radial basis function networks
- 7) Neuronal maps: Kohonen network, Growing Neural Gas
- 8) Optimization methods

*Learning objectives:*

Theoretical understanding of feedforward neural networks, practical skills in computer implementations

*Soft skills:*

Each student must present the results of one exercise.

*Individual competences:*

Programming selected routines in C++, theoretical understanding of feedforward Neural Networks

## LECTURE

## INTRODUCTION TO PERCEPTION (310 006)

PROF. SEN CHENG

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 10 – 12 (First Meeting: 15.10.2018)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	3

Perception of sensory inputs can be studied along three different dimensions: modality, description level and methodology. This lecture will discuss several different examples along each dimension and highlight common principles, when possible. Modalities include, for instance, vision, audition, olfaction and proprioception. The description level will range from receptor physiology to Gestalt psychology. The methodology will include psychophysics, electrophysiology and computational modeling.

**Prerequisite:** *[no special prerequisite]*

**Assessment:** final exam

**Attendance:** optional, but highly recommended

**Course material:** Moodle (sign-up required)

**Textbook:** Sensation and Perception by E. Bruce Goldstein, 8th or 9th ed, Wadsworth

**Contact:** Prof. Sen Cheng, **NB 3/33**,  
sen.cheng@rub.de



*LECTURE***THE NEURAL BASIS OF VISION (310 025)**

PROF. SEN CHENG

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Friday, 10 – 12 (First Meeting: 19.10.2018)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	3
	Max. 20 students

Of all modalities vision is best studied, perhaps due to the dominance of the visual sense in humans. Even so much is still unknown about the neural basis of vision and visual plasticity. The goal of this seminar is to introduce students to the classic and current research literature. Therefore, a range of experimental approaches will be covered, including electrophysiology and imaging techniques such as fMRI, EEG and MEG. The topics will be assigned to the students in the first meeting.

**Enrollment:** VSPL, max. 20 students

**Assessment:** presentation in class

**Attendance:** mandatory, min. 66%

**Course material:** Moodle (sign-up required)

**Contact:**

Prof. Sen Cheng, NB 3/33, sen.cheng@rub.de

Dr. Amir Azizi, NB 3/70, amir.azizi@rub.de

*ONE-WEEK INTERNSHIP*  
**AUTONOMOUS ROBOTICS (310 036)**  
PROF. GREGOR SCHÖNER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	<b>2019, FEBRUARY 11.-15.</b> (Preliminary meeting: 2019, February 2, 10.15h, NB 3/57)
<b>ROOM:</b>	NB 02/77
<b>CP:</b>	3

The practical course gives an introduction to mobile robotics with a focus on dynamical systems approaches. In the exercises, the computing environment Matlab is used to control e-puck miniature mobile robots, equipped with a differential drive, combined infrared/proximity sensors and a video camera. The course covers elementary problems in robot odometry, use of sensors and motor control. It then teaches basic dynamic methods for robot navigation, in which the robot's sensors are used for obstacle avoidance and approach to a target location.

Interested students who do not have experience in Matlab should attend the Matlab introduction of the lab exercise Computer Vision (typically the week before this course). Details about availability and credit points have to be clarified early via email.

**Contact:** [mathis.richter@ini.rub.de](mailto:mathis.richter@ini.rub.de)

**Enrollment:** 01.12.2017-12.01.2018 e-mail  
[mathis.richter@ini.rub.de](mailto:mathis.richter@ini.rub.de)

*LECTURE***LEFT BRAIN - RIGHT BRAIN (118 111)**

PROF. ONUR GÜNTÜRKÜN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 12- 14 (First meeting: 11.10.2018) Exam: 27.03.2019, 10 – 12, HIA
<b>ROOM:</b>	IAFO 02/461
<b>CP:</b>	3

Most of our brain's processes are executed by different mechanisms in the left and the right hemisphere. Language, spatial orientation, motor control, emotional processing, face perception, and even the ability to comprehend the rhythm of a drum are guided by neural circuits that are differently tuned within the two hemispheres. These asymmetries of mental processing mean

that damages of the human brain cannot be understood without a thorough understanding of asymmetries. The lecture aims at explaining the

current knowledge about the structure and the mechanisms of cerebral asymmetries by making use of highly interactive teaching methods.

*SEMINAR***THE EVOLUTION OF HIGHER COGNITIVE FUNCTIONS IN  
NON-HUMAN ANIMALS (112 615)**

DR. FELIX STRÖCKENS, SARAH VON EUGEN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 12 - 14 (First Meeting: 11.10.2018) Max. 24 participants
<b>ROOM:</b>	IA 1/91
<b>CP:</b>	3

Humans represent without a doubt the pinnacle in the evolution of higher cognitive functions. However, other non-human animals, even outside the primate order, also possess surprisingly complex forms of higher cognition. Within this seminar, selected studies on the occurrence of such complex cognitive skills will be presented by students, focusing on species like chimpanzees, parrots, crows and dolphins. Furthermore, the seminar aims to clear up with some of the myths about what animals are capable of and what is beyond their reach. In addition to behavioral data, the seminar will also deal with the question what the neuronal underpinnings of such skills are, and if there are any neuronal similarities between species expressing complex cognition. By dealing with these topics, participants of the seminar will get an overview of the cognitive abilities of non-human animals and learn that many of the cognitive skills considered unique to humans actually developed much earlier during evolution. The seminar will be held in English and students are required to give a talk on preselected literature.

*LECTURE & EXERCISE***MACHINE LEARNING: UNSUPERVISED METHODS****(310 003 & 310 013)**

PROF. LAURENZ WISKOTT

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Tuesday, 12.15 – 13.45 (First Meeting: 09.10.2018)
<b>EXERCISE:</b>	Tuesday, 10.30 – 12 (First Meeting: 16.10.2018)
<b>ROOM:</b>	NB 3/57
<b>CP:</b>	6

This course covers a variety of unsupervised methods from machine learning such as principal component analysis, independent component analysis, vector quantization, clustering, self-organizing maps, growing neural gas, Bayesian theory and graphical models. We will also briefly discuss reinforcement learning. The mathematical level of the course is mixed but generally high. The tutorial is almost entirely mathematical. Criteria for a certificate for the tutorial are an active participation, in particular presentation of selected exercises, and at least 50% in the final exam.

*SEMINAR***EXERCISE LEARNING (112 240)**

MENG GAO

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 14-16 (First Meeting: 09.10.2018) Max. 30 participants
<b>ROOM:</b>	IAFO 02/445
<b>CP:</b>	3

This practical participation-based course will provide an applied overview of the psychological foundations of learning and behaviour, 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 behaviour 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 research studies.

#### Learning Objectives

1. Acquire general content knowledge about the field of 'Learning' and 'Behaviour' 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.

## SEMINAR

**SELF-DECEPTION AND PREDICTIVE CODING (030088)**

FRANCESCO MARCHI

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 10 – 12 (First Meeting: 09.10.2018)
<b>ROOM:</b>	GABF 04/709
<b>CP:</b>	6

In this seminar we will discuss a common variety of motivated and irrational route to belief formation and maintenance commonly known as Self-deception. According to several authors we often deceive ourselves about our own performance and skills. However, the possibility of Self-deception poses serious philosophical problems because it is thought to lead to paradox. We will examine the arguments behind this position and focus on one of the way to avoid the paradoxes, namely, the deflationary view. Afterwards, we will discuss how the deflationary view of Self-deception can be accommodated within the prediction-error minimization (PEM) framework for modelling cognition. As we shall discover, Self-deception may have an important function for adaptive behaviour and it can happen according to four main strategies, each of which can be adequately modelled in the PEM framework.

## Suggested literature:

Self-deception entry in the Stanford Encyclopedia of Philosophy. <https://plato.stanford.edu/entries/self-deception/>

Mele, A. R. (2001). *Self-Deception Unmasked*. Princeton University Press. (selected chapters)

Mele, A. R. (2004). MOTIVATED IRRATIONALITY. *The Oxford Handbook of Rationality* (pp. 240–255). Oxford University Press. <http://doi.org/10.1093/0195145399.003.0013>

McKay, R. T., & Dennett, D. C. (2009). The evolution of misbelief. *Behavioral and Brain Sciences*, 32(6), 493–510– discussion 510–61. <http://doi.org/10.1017/S0140525X09990975>

Lynch, K. (2012). On the “tension” inherent in self-deception. *Philosophical Psychology*, 25(3), 433–450. <http://doi.org/10.1080/09515089.2011.622364>

Nelkin, D. K. (2002). Self-Deception, Motivation, and the Desire to Believe. *Pacific Philosophical Quarterly*, 83(4), 384–406. <http://doi.org/10.1111/1468-0114.t01-1-00156>

Hohwy, J. (2013). *The Predictive Mind*. OUP Oxford. (selected chapters)

## SEMINAR

**PROBABILISTIC MODELS IN THE PHILOSOPHY OF LANGUAGE AND COGNITION (030 087)**

PROF. MARKUS WERNING

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 16 – 18 (First Meeting: 09.10.2017)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	6

Probability theory has received increased attention both as an object and as a tool of research in the Philosophy of Language and Cognition. Even though probability theory is widely regarded as an ideal of rationality, a number of apparent paradoxes on how humans reason with probabilities have been discovered and analyzed in recent years. Does this challenge the assumption that humans are generally rational or do we have to revise our theory of rationality, instead? These questions have become a dominant theme in both, Cognitive Science and the Philosophy of Cognition. In the first half of the seminar, several of these paradoxes and their proposed solutions will be discussed.

Probability theory has also been used by cognitive scientists and philosophers to generate models of linguistic comprehension and cognitive processes. These will be the subject of the second half of the seminar and include topics such as Predictive Coding, Rational Speech Act Theory and Bayesian theories of concept learning.

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

## Literature

- Frank, M. C., & Goodman, N. D. (2012). Predicting Pragmatic Reasoning in Language Games. *Science*, 336(6084), 998–998.
- Hertwig, R., & Gigerenzer, G. (1999). The 'Conjunction Fallacy' Revisited. How Intelligent Inferences Look like Reasoning Errors. *Journal of Behavioral Decision Making*, 12, 275–305.
- Kemp, C., & Tenenbaum, J. B. (2009). Structured Statistical Models of Inductive Reasoning. *Psychological Review*, 116(1), 20–58.
- Kuperberg, G. R. & Jaeger, T. F. (2016). What do We Mean by Prediction in Language Comprehension? *Language, Cognition and Neuroscience*, 31, 32-59.
- Tversky, A., & Kahneman, D. (1983). Extensional versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment. *Psychological Review*, 90(4), 293-315.
- Xu, F., & Tenenbaum, J. B. (2007). Word Learning as Bayesian Inference. *Psychological Review*, 114(2), 245-272.



*SEMINAR***KNOWLEDGE AND CONCEALED QUESTIONS (030067)**

INSA LAWLER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 16 – 18 (First Meeting: 08.10.2017)
<b>ROOM:</b>	GA 03/46
<b>CP:</b>	6

Knowledge and concealed questions Kommentierung: Knowing that  $p$ , such as knowing that the cat is on the mat, is of central interest in epistemology. Yet, there is a variety of knowledge. We also speak about knowing when, why, or how often the cat is on the mat. Such knowledge is dubbed knowledge-wh. According to the dominant approach, the content of knowledge-wh is analyzed in terms of answers to the so-called concealed question expressed by the wh-clause. If 'The cat is on the mat twice a day' expresses a correct answer to 'How often is the cat on the mat?' and if one knows that the cat is on the mat twice a day, one knows how often the cat is on the mat. In our seminar, we first take a closer look at what concealed questions are. Then, we discuss whether knowledge-wh reduces to knowledge-that, whether knowledge-wh is inherently context-sensitive, and whether knowing wh to  $X$ , such as knowing how to sit on the mat, is a different kind of knowledge than all other forms of knowledge-wh.

An optional article for the first session is "Knowing-Wh and Embedded Questions" by Ted Parent, published in *Philosophy Compass* 9(2) (<https://doi.org/10.1111/phc3.12104>). Additional literature will be announced in the first session.

*SEMINAR***REASONS (030068)**

PROF. TOBIAS SCHLICHT, JUDITH MARTENS

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 10 – 12 (First Meeting: 09.10.2017)
<b>ROOM:</b>	GA 03/46
<b>CP:</b>	6

One central topic in the Philosophy of Cognition is our understanding of reasons in the context of human action. As individuals, we want to understand the men and women around us, because we like, love, or loathe them, or find them interesting or intriguing—or, often enough, merely for practical purposes of one kind or another. And so we try to work out how the affections and movements of their hearts—their emotions, desires, values, and reasons—combine and are manifested in what they say and do, and in what they fail to say and fail to do. Some of the questions we will address in this seminar are: What are reasons? Are there different kinds of reasons? Are reasons beliefs and desires? If not, how are they related to beliefs and desires? And what role do they play in motivating and explaining actions?

Reading:

M. Alvarez: *Kinds of Reasons*. Oxford 2010.

*SEMINAR***REPRESENTATIONAL FORMATS: BETWEEN ICONS AND SYMBOLS  
(030093)**

ALFREDO VERNAZZANI

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 10 – 12 (First Meeting: 09.10.2017)
<b>ROOM:</b>	GABF 04/358
<b>CP:</b>	6

Most cognitive scientists assume some form of representationalism, the claim that the mind is constituted at least in part by the occurrence, processing, and storage of information-bearing structures that possess semantic properties. These semantic-evaluable internal states or processes are called mental representations. To a large extent the contemporary debate about mental representations has been polarized by the contrast between defenders of the representational orthodoxy and proponents of various forms of anti-representationalism.

A relatively neglected topic, however, is that of the representational formats. Representations in general, and mental representations as well, can take different forms. For example, they may be picture-like or iconic; or they might be symbolic, or language-like. By analogy, one can think of a painting representing a landscape, and a linguistic or verbal description of the landscape: they both represent the same thing, but they do so in different formats. The distinction between these two kinds of representational formats seems quite intuitive, and yet, it has proved surprisingly difficult to clearly spell out their distinctive properties.

In this course, we will discuss the problem of representational formats, reading both classic and recent contributions, by, among others: John Haugeland, Jerry Fodor, Aaron Sloman, Stephen Palmer, Barbara Tversky, and Tyler Burge.

Introductory Reading:

J. Haugeland "Representational Genera" in his *Having Thought: Essays in the Metaphysics of Mind*. Harvard University Press (1998), S. 171-206.

*SEMINAR***HUMOR – PERSPECTIVES FROM PHILOSOPHY OF LANGUAGE AND  
COGNITIVE SCIENCE (T.B.A.)**

PROF. MARKUS WERNING

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 12 – 14 (First Meeting: 11.10.2017)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	6

t.b.a.

## AM. Advanced Methods

Advanced methods are usually studied in the second semester. The following two courses are exceptions, while the "fMRI"-course is only offered in the winter term.

### Remarks for AM5

There is a laboratory lab class on molecular genetics offered within the semester break for students with a background knowledge in biology, molecular biology or psychobiology. The class will be held in German language. Participation in this basic lab class is required for attending the advanced lab class next summer semester.

### Remarks for AM7

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: [N.N.](#) \*\*\*t.b.a.

Students who would like to acquire basic background knowledge in the field of neuroimaging, are recommended to attend the seminar "Bildgebende Verfahren in der Neuropsychologie" (held in german language) from section D1 (lecturer: Prof. Boris Suchan).

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](http://www.ruhr-uni-bochum.de/philosophy/mcs/program_courses.html). They will again be offered in the upcoming summer semester.

## SEMINAR

**MOLEKULARGENETISCHES LABORPRAKTIKUM (118 514)**

DR. DIRK MOSER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	<b>Blockseminar:</b> 04. – 08. 02.2018 (Preliminary Meeting: 15.11.2018, 13.30 – 14, IB 5/103)
<b>ROOM:</b>	IB 5/103
<b>CP:</b>	t.b.a.

**Language** of the lab class is **GERMAN**.

Das Grundpraktikum „Molekulare Psychologie“ soll interessierten Studierenden die Schnittmenge zwischen Psychologie und Biologie experimentell begreifbar machen. Hierzu wird jeder PraktikumssteilnehmerIn aus eigenem Blut DNA extrahieren und diese im Verlauf der Woche auf verschiedene, in der psychobiologischen Forschung prominente Genvarianten überprüfen. Hierzu finden eine Vielzahl molekularbiologischer Methoden Anwendung. Praktikumsbegleitend werden molekulare Grundlagen sowie experimentelle Möglichkeiten, sowie die Ergebnisse der eigenen praktischen Versuche in Spezialvorträgen präsentiert und diskutiert.

Vorbesprechung ist am 20.10.2016 um 16:00 Uhr

Der einwöchige Kurs (Mo-Fr 9:00 bis 13:00) findet im Anschluss an das Wintersemester in den Semesterferien statt und ist auf 6 Teilnehmer beschränkt.

**Teilnahmevoraussetzung:** gute bis sehr gute Kenntnisse in Biologie/Molekularbiologie/Psychobiologie.  
**Praktikumssprache ist Deutsch.**

PRACTICAL COURSE/EXERCISE

NEUROPSYCHOLOGICAL METHODS: FMRI (118512)

PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	08.10.2018 16:00h - 18:00h IA 1/163 13.10.2018 10:00h - 18:00h IA 1/157 20.10.2018 10:00h - 18:00h IA 1/157 26.01.2019 10:00h - 18:00h IB 02/109
<b>CP:</b>	t.b.a.

*(see remarks for AM7 on page 23)*

**Practical course and seminar have to be attended both together. They cannot be taken individually. Please also see remarks for AM7 above.**

This seminar can only be taken in combination with the theoretical course (course number: 118518). You must participate in both courses to get credit points. The aim of this course is to learn how the fMRI can be used to acquire new scientific knowledge. The participants shall measure and analyze fMRI data and present their results in a scientific manner. To pass this course, participants must be present on at least 2/3 of the seminar and participate in practical scanning sessions as an experimenter. This course is designed specifically for students of the cognitive science master program.

Please register online if interested.

The first meeting is on the 08.10.2018 at 4:00 p.m. (IA 1/163). Interested students which remain on the waiting list can come to the first session and fill eventual free spots.

## SEMINAR

NEUROPSYCHOLOGICAL METHODS: FMRI (118 518)

PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	08.10.2018 16:00h - 18:00h IA 1/163 13.10.2018 10:00h - 18:00h IA 1/157 20.10.2018 10:00h - 18:00h IA 1/157 26.01.2019 10:00h - 18:00h IB 02/109
<b>CP:</b>	t.b.a.

**Practical course and seminar have to be attended both together. They cannot be taken individually. Please also see remarks for AM7 above.**

This seminar can only be taken in combination with the practical course (course number: 118519). You must participate in both courses to get credit points. The aim of this course is to learn how the fMRI can be used to acquire new scientific knowledge. The participants shall measure and analyze fMRI data and present their results in a scientific manner. To pass this course, participants must be present on at least 2/3 of the seminar and participate in practical scanning sessions as an experimenter. This course is designed specifically for students of the cognitive science master program.

Please register via online registration if interested.

The first meeting is on the 08.10.2018 at 4:00 p.m. (IA 1/163). Interested students which remain on the waiting list can come to the first session and fill eventual free spots.



## D1. Free Selection

There is one free selection module in the program which can take any course of the program you passed and do not need to complete the modules. If there is a problem to complete a module, in principle, the courses in the free selection module can be used for obligatory modules. But this has to be explicitly confirmed in advance by Dr. Pascale Willemsen or Prof. Albert Newen. Students are only allowed to take maximally 3 German courses in the whole program up to maximally 12 credit points.

D1.

Free Selection

*SEMINAR*

**DISKURS NEUROPSYCHOLOGIE (118 611)**

PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 10.00 – 12.00 (First Meeting: 11.10.2018)
<b>ROOM:</b>	IA 1/87
<b>CP:</b>	3

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. Ein zentrales Lernziel dieser Veranstaltung - und damit auch Grundlage für die erfolgreiche Teilnahme und Leistungsbewertung - ist die regelmäßige aktive Beteiligung am wissenschaftlichen Diskurs. Daher ist eine regelmäßige Anwesenheit im Umfang von mindestens zwei Dritteln der Termine notwendig.

*LECTURE***STRESS (117 031)**

PROF. OLIVER WOLF

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 12 – 14 (First Meeting: 15.10.2018) Exam: Monday, 2019, March 25, 14 – 16 in HIA
<b>ROOM:</b>	HIA
<b>CP:</b>	t.b.a.

Ursachen und Folgen von Stress werden aus einer psychologischen Perspektive beleuchtet. Es werden sowohl Aspekte der biopsychologischen Grundlagenforschung als auch Aspekte der anwendungsbezogenen Forschung (Gesundheitspsychologie, Klinische Psychologie, Wirtschaftspsychologie) berücksichtigt. Die Vorlesung gibt einen Überblick über aktuelle Forschungsthemen der Stressforschung. Folgende Fragen werden adressiert: Was ist Stress? Was ist ein Stressor? Welche psychischen und biologischen Veränderungen treten in Reaktion auf Stress auf? Wie kann man sich die große interindividuelle Varianz im Stresserleben erklären? Wann ist Stress adaptiv und unter welchen Umständen kann er negative Konsequenzen haben (maladaptiv sein)? Welche Auswirkungen hat Stress auf affektive und kognitive Prozesse? Wie wird unser Körper und unser Gehirn durch Stress beeinflusst? Neben psychologischen Ansätzen werden Theorien und Befunde aus den Forschungsfeldern der Psychoneuroendokrinologie, der Psychoneuroimmunologie und den affektiven und kognitiven Neurowissenschaften besprochen.

*LECTURE*  
**LERNEN (112 231)**  
PROF. ONUR GÜNTÜRKÜN

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Thursday, 16.00 – 18.00 (First Meeting: 11.10.2018) Exam: Monday, 2019, March 25, 10 – 12 in HIA
<b>ROOM:</b>	HIA
<b>CP:</b>	3

Die Vorlesung soll einen Überblick über die Lerngesetze, ihre Anwendungsmöglichkeiten in therapeutischen Verfahren und die hirnhysiologischen Grundlagen von Lern- und Gedächtnisprozessen bieten. Soweit möglich, sollen alle drei Aspekte immer zusammen besprochen werden; z.B. werden bei der klassischen Konditionierung zuerst die historischen Entwicklungslinien, dann die Details des eigentlichen Lernphänomens, dann die therapeutischen Anwendungen (z.B. systematische Desensibilisierung) und anschließend die synaptischen Mechanismen referiert.

Begleitend zur Vorlesung "Lernen" von Prof. Dr. Güntürkün soll dieses Seminar verschiedene Fragen zur wissenschaftlichen Auseinandersetzung mit dem Thema Lernen vertiefen. Dazu werden die Studierenden wissenschaftliche Artikel und Kapitel aus Lehrbüchern in Referatsform vortragen.

Literatur:

Als Vorbereitung ist folgendes Buch zu empfehlen: The Principles of Learning and Behaviour, Michael Domjan, 7. Auflage, 2015

*SEMINAR***JOURNAL CLUB: NEUROPSYCHOANALYSE (118 915)**

PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 16 – 18 (First Meeting: 11.10.2018)
<b>ROOM:</b>	IA 1/87
<b>CP:</b>	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. Ein zentrales Lernziel dieser Veranstaltung - und damit auch Grundlage für die erfolgreiche Teilnahme und Leistungsbewertung - ist die regelmäßige aktive Beteiligung am wissenschaftlichen Diskurs. Daher ist eine regelmäßige Anwesenheit im Umfang von mindestens zwei Dritteln der Termine notwendig

*SEMINAR***BILDGEBENDE VERFAHREN IN DER NEUROPSYCHOLOGIE (118 513)**

PROF. BORIS SUCHAN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Wednesday, 14-16 (First meeting: 10.10.2018)
<b>ROOM:</b>	IA 1/87
<b>CP:</b>	3

In diesem Seminar sollen die für den/die Neuropsychologen/in relevante bildgebende Verfahren vorgestellt werden. Hierbei werden sowohl die theoretischen Grundlagen, als auch die Methoden in der Versuchsplanung und Auswertung vorgestellt. Anhand von ausgewählten Arbeiten werden die Kenntnisse in Methode und Anwendung vertieft. Folgende bildgebende Verfahren, deren Anwendung und Auswertung werden vorgestellt: Positronen Emissions Tomographie (PET), Single Photonen Emissions Computer Tomographie (SPECT), Magnet Resonanz Tomographie/Funktionelle Magnet Resonanz Tomographie, Magnet Enzephalographie (MEG), Transkranielle Magnetstimulation (TMS), Statistical Parametric Maps (SPM). Es ist geplant, eine Auswertung eines Experimentes exemplarisch während des Seminars durchzuführen. Eventuelle praktische Sitzungen (MRT-Scans) sind je nach Terminplanung auch möglich. Ein zentrales Lernziel dieser Veranstaltung - und damit auch Grundlage für die erfolgreiche Teilnahme und Leistungsbewertung - ist die regelmäßige aktive Beteiligung am wissenschaftlichen Diskurs. Daher ist eine regelmäßige Anwesenheit im Umfang von mindestens zwei Dritteln der Termine notwendig.

Eine Literaturliste ist zu Beginn des Seminars erhältlich

*LECTURE***SOZIALPSYCHOLOGIE II (112 321)**

PROF. JENS FÖRSTER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 10.00 – 12.00 (First Meeting: 11.10.2018) Exam: Friday, 2019, March 22, 10 – 12, HIA
<b>ROOM:</b>	HZO 40
<b>CP:</b>	3

Wie erfahren wir, wer wir sind? Brauchen Menschen eher Freiheit oder eher Orientierung? Was ist das Unbewusste? Wie gehen wir mit Misserfolgen um und wie erreichen wir unsere Ziele? Wie können wir uns motivieren, etwas zu tun? Wie überwinden wir Hindernisse? Neigen alle Menschen dazu, andere zu diskriminieren? Haben wir alle aggressive Anteile? Wie entsteht Aggression? Und wie entstehen Konflikte zwischen Gruppen? Wie kann man Zivilcourage fördern? Fördert Brainstorming die Kreativität oder behindert sie sie?

In der Vorlesung zur Sozialpsychologie 2 wollen wir die Inhalte der Vorlesung zur Sozialpsychologie 1 vertiefen. Zudem sollen Anwendungsaspekte diskutiert und Forschungsmethoden anhand von Experimenten dargestellt werden. Brücken zur soziologischen, philosophischen, konsumenten-psychologischen, organisationspsychologischen, emotionspsychologischen, motivationspsychologischen und wirtschaftspsychologischen Forschung werden geschlagen, Überschneidungen werden diskutiert.

**D1.**

Free Selection

*COLLOQUIUM***FORSCHUNGSKOLLOQUIUM SOZIALPSYCHOLOGIE (115 915)**

PROF. JENS FÖRSTER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 16.00 – 18.00 First Meeting: 11.10.2018)
<b>ROOM:</b>	IAFO 02/452
<b>CP:</b>	t.b.a.

In diesem Kolloquium sollen Pläne für wissenschaftliche Studien, Ergebnisse und Methoden diskutiert werden. Wissenschaftlerinnen und Wissenschaftler in den unterschiedlichsten Phasen ihrer Karriere berichten über neue Entwicklungen und Probleme sozialpsychologischer Forschung. Für Studierende mit gutem Vorwissen. Meist englische Originalliteratur. Wird bekanntgegeben. Evtl. Vorträge in englischer Sprache

**D1.**

Free Selection

*VORLESUNG***GRUNDLAGEN DER NEURO- UND SINNESPHYSIOLOGIE (112241)**

PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Wednesday, 8 – 10 (First meeting: 10.10.2018) Exam: Thursday, 28.03.2019, 10 – 12, HGA 10
<b>ROOM:</b>	HIA
<b>CP:</b>	3

Ziel der Vorlesung ist es, ein Grundverständnis der Informationsverarbeitung im ZNS und der Sinnesorgane zu übermitteln. Neben den anatomischen Grundlagen im Aufbau von Nervenzellen werden auch das Verhalten, d.h. die Erregungsleitung und -übertragung, sowie die Verrechnungsprozesse an Synapsen näher betrachtet. Hierbei soll auch ein Schwerpunkt auf die synaptische Plastizität gelegt werden. Auch die in der Psychologie und Medizin eingesetzten diagnostischen Verfahren, wie z. B. das EEG, sollen erläutert werden.

*VORLESUNG***MOTIVATION UND VOLITION (112 271)**

DR. MARLIES PINNOW

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 16 – 18 (First meeting: 08.10.2018) Exam: Tuesday, 10 – 12, 2019, March 19, HIA
<b>ROOM:</b>	HZO 40
<b>CP:</b>	3

Die Vorlesung führt in das Gebiet der Motivations- und Volitionspsychologie ein. In einem ersten Abschnitt wird in einem kurzen Überblick über die Forschungs- und Problemgeschichte eine Gegenstandsbestimmung der Motivationspsychologie und ihrer zentralen Fragestellungen erarbeitet. Darüber hinaus werden zentrale Methoden der Motivationsforschung erörtert. Auf dieser Basis werden dann einzelne Verhaltenssysteme wie Hunger, Neugier, Angst, Leistung, Aggression diskutiert. Spezifische Ansätze wie Attributionstheorien, Erwartungs- X Wert-Modelle, Instrumentalitätstheorie etc. werden innerhalb der Motivsysteme oder als Exkurse behandelt. Den Abschluss bildet eine Erörterung handlungstheoretischer und volitionaler Probleme zielgerichteten Verhaltens.



## SEMINAR

**MEIN KÖRPER UND ICH – WAS UNS BEWUSSTSEINS-  
PHÄNOMENE ÜBER DIE WAHRNEHMUNG UNSERES SELBST  
ERZÄHLEN (112 616)**

PROF. MARTINA MANNIS

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Wednesday, 12 – 14 (First Meeting: 10.10.2018)
<b>ROOM:</b>	IA 1/87
<b>CP:</b>	3 CP
	Max. 30 participants

Die Kognitive Psychologie zeigt uns, dass das Bild, welches wir uns von der Welt machen, eine Interpretation unseres Gehirns ist. Dies gilt auch für die bewusste Wahrnehmung unseres Selbst. Der portugiesische Dichter Fernando Pessoa beschreibt dies so „Meine Seele ist ein verborgenes Orchester; ich weiß nicht, welche Instrumente, Geigen und Harfen, Pauken und Trommeln es in mir spielen und dröhnen lässt. Ich kenne mich nur als Symphonie“. Basierend auf Referaten, aber auch in hoffentlich kontroversen Diskussionsrunden werden wir in diesem Seminar verschiedene Bewusstseinsphänomene besprechen und so bizarre Phänomene wie Phantomglieder, Out-of-Body-Experience, Anosognosie oder Cotard Syndrom kennenlernen. Wir wollen hierzu das biopsychologische Wissen beleuchten um zu verstehen, wie das Gehirn ein Bild unseres Selbst erzeugt.

Literatur wird zu Beginn des Seminars bekannt gegeben. Ein populärwissenschaftliches Buch zum Thema ist: Vilaynur S. Ramachandran, Sandra Blakeslee. Die blinde Frau, die sehen kann: Rätselhafte Phänomene unseres Bewusstseins. Taschenbuchausgabe rororo;

*LECTURE***KOGNITION 1: WAHRNEHMUNG, AUFMERKSAMKEIT,  
GEDÄCHTNIS (112 211)**

PROF. OLIVER T. WOLF

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 12 – 14 (First Meeting: 12.10.2018) Exam: Thursday, 2019, March 14, 10 – 12, HIA
<b>ROOM:</b>	HIA
<b>CP:</b>	3 CP

Die Vorlesung gibt einen Überblick über wichtige Stationen der menschlichen Aufnahme und Verarbeitung von Informationen aus der Umwelt. Dabei werden zunächst visuell und auditiv wahrnehmbare Umwelteigenschaften dargestellt. Anschließend werden einige grundsätzliche Prinzipien der frühen kognitiven Verarbeitung dieser Information besprochen. Die selektive oder parallele Weiterverarbeitung dieser Information ist Gegenstand des nachfolgenden Abschnitts Aufmerksamkeit, in dem Gesetzmäßigkeiten der Aufmerksamkeitslenkung bzw. der Bedingungen für die mehr oder weniger vollständige Aufnahme von Information in das Bewusstsein im Vordergrund stehen. Den Abschluss der Vorlesung bilden Theorien über kurzzeitige Formen (Sensorisches Gedächtnis und Arbeitsgedächtnis) und überdauernder Formen (Langzeitgedächtnis und dessen Subkomponenten) der Speicherung.

D1.

Free Selection

*SEMINAR*

**SITUIERTE KOGNITION (T.B.A.)**

PROF. TOBIAS SCHLICHT

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 12 – 14 (First Meeting: 12.10.2018)
<b>ROOM:</b>	T.B.A.
<b>CP:</b>	6

t.b.a.

## SECOND YEAR PROGRAM

### I. Interdisciplinary Research Module

If a student wants to use a course from C1 to C4 as a substitute for I1 to I4, this is possible if the substitute course is closely connected with the master thesis project.

I1.

I1. Cognitive Philosophy

*COLLOQUIUM*

**PHILOSOPHY AND THE COGNITIVE SCIENCES – RECENT DEBATES AND LEARNING TO MAKE A PRESENTATION IN ENGLISH (030 127)**

PROF. ALBERT NEWEN, PROF. MARKUS WERNING

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday, 16 – 18 (First Meeting: 25.10.2018)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	6

The colloquium will offer regular presentations given partly by Bochum MA and PhD students and partly by external guests. The presentations will all be in the general domain of theoretical philosophy and the cognitive sciences with a focus on language and concepts. The presentations should ideally, but not necessarily have some interdisciplinary dimension such that perspectives from philosophy, psychology, linguistics and neurosciences can be systematically interconnected. The aim of the colloquium is to offer a platform for the discussion of ongoing research and to support the education of students at the Master and PhD level. Students who are accepted for a presentation in this seminar will receive a special training in preparing presentations in English.

PhD-students who are interested in presentations should write an email to both organizers (albert.newen@rub.de and markus.werning@rub.de) and come to the first meeting. The semester program will be fixed then. PhD-students can receive 2 credit points for an active participation. MA students can receive 4-6 CP for a presentation in the colloquium (to receive a mark, MA students have to write an additional essay). Topics can be freely chosen such that MA students can develop a talk in the area of their MA project.

Language: The presentations in the colloquium and the discussion will be in English. Questions can be raised in German, but will then be translated for the whole audience.

11.

11. Cognitive Philosophy

*COLLOQUIUM*

**EXTRA RESEARCH COLLOQUIUM "METAPHILOSOPHY AND  
EXPERIMENTAL PHILOSOPHY" (030122)**

DR. JOACHIM HORVATH

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Wednesday, 17 – 19 (First Meeting: 10.10.2018)
<b>ROOM:</b>	GA 1/128 ("CIP-Insel")
<b>CP:</b>	6

In this research colloquium, we will discuss current topics from metaphilosophy and experimental philosophy, broadly construed. The colloquium will also host talks by a number of external guests, some of which will be leading experts in their field. Students at the master or doctoral level will be given the opportunity to present their work in English.

# 12.

## I2. Cognitive Psychology

### COLLOQUIUM

#### RESEARCH COLLOQUIUM GENETIC PSYCHOLOGY (118 913)

PROF. ROBERT KUMSTA

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 16.00 – 18.00 (First Meeting: 15.10.2018)
<b>ROOM:</b>	IA 1/161
<b>CP:</b>	t.b.a.

This course serves to present the current research work and qualification theses (Bachelor, Master theses, PhD project) of the Genetic Psychology unit. Moreover, invited scientists will present the latest research results in the area of Genetics, Epigenetics and Development Psychobiology. An overview of the topics and speakers will be announced with posters and on the Homepage.

# 12.

## Cognitive Neuroscience

### COLLOQUIUM

#### RESEARCH COLLOQUIUM NEUROPSYCHOLOGY (118 916)

PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Thursday 14-16 (First meeting: 18.10.2018)
<b>ROOM:</b>	IA 1/87
<b>CP:</b>	t.b.a.

The content of this course is to present current research work in the spheres of neuropsychology and talks by guest professors on clinical neuropsychological topics. The schedule with information on the topics and speakers will be posted on the information board and at <http://www.ruhr-uni-bochum.de/neuropsych/> before the start of the WS. The central educational goal of this course – and as such the basis for a successful participation and awarding of credits – is regular active contribution to the scientific discourse. Therefore, regular attendance in the scope of at least 2/3 of the sessions is required.

*COLLOQUIUM***SCIENTIFIC COLLOQUIUM: COGNITIVE PSYCHOLOGY AND  
PSYCHONEUROENDOCRINOLOGY (115 113)**

PROF. OLIVER T. WOLF

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 16.00 – 18.00 (First Meeting: 16.10.2018)
<b>ROOM:</b>	IAFO 02/445
<b>CP:</b>	t.b.a.

In this forum, scientific projects (i.e. Master and PhD projects) of the Cognitive Psychology work group will be presented. The main focus is on experimental stress studies. Here we will try to answer the questions, "what makes us stressed" and "how does stress affects our cognitive skills". In addition, invited guests from our faculty, from other faculties of the RUB and from other universities world wild will present their current research findings on topics that relate to cognitive psychology or psychoneuroendocrinology.

An overview of the schedule will be available on the AE homepage at the beginning of the semester.

The seminar will be held in the English language.

Students in the 3rd semester who think about conducting their master thesis with our AE can participate.

*LECTURE & EXERCISE***MACHINE LEARNING: UNSUPERVISED METHODS****(310 003 & 310 013)**

PROF. LAURENZ WISKOTT

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Tuesday, 12 – 14 (First Meeting: 09.10.2018)
<b>EXERCISE:</b>	Tuesday, 10:30 – 12 (First Meeting: 16.10.2018)
<b>ROOM:</b>	NB 3/57
<b>CP:</b>	6

This course covers a variety of unsupervised methods from machine learning such as principal component analysis, independent component analysis, vector quantization, clustering, self-organizing maps, growing neural gas, Bayesian theory and graphical models. We will also briefly discuss reinforcement learning. The mathematical level of the course is mixed but generally high. The tutorial is almost entirely mathematical. Criteria for a certificate for the tutorial are an active participation, in particular presentation of selected exercises, and at least 50% in the final exam.



**CANCELLED***LECTURE & EXERCISE***ARTIFICIAL NEURAL NETWORKS (310 002 & 310 012)**

PD DR. ROLF WÜRTZ

<b>TERM:</b>	Winter 2018/19
<b>LECTURE:</b>	Friday, 12 – 14 (First Meeting: 12.10.2018)
<b>ROOM:</b>	HZO 100
<b>EXERCISE:</b>	Wednesday, 14 – 18 (1 hour groups) (First Meeting: 17.10.2018)
<b>ROOM:</b>	NA 5/99
<b>CP:</b>	5

This lecture presents standard algorithms and new developments of feedforward Artificial Neural Networks, their functioning, application domains, and connections to more conventional mathematical methods. Examples show the potential and limitations of the methods. Supervised as well as unsupervised learning methods are introduced.

In detail:

- 1) Introduction, some biological facts
- 2) Mathematical foundations: probability theory and partial derivatives
- 3) One layer networks and linear discriminants
- 4) Multilayer networks and error backpropagation
- 5) Universality of two-layer networks

- 6) Radial basis function networks
- 7) Neuronal maps: Kohonen network, Growing Neural Gas
- 8) Optimization methods

The course will be given in English upon request.

Grades and credits are given according to the percentage of solved problems in exercise 310012 and presentation of a solution during the exercise.

Literature suggestions:

C. M. Bishop, *Neural Networks for Pattern Recognition*, 1995 Clarendon Press, Oxford.  
S. Haykin, *Neural Networks and Learning Machines*, 3rd edition, 2003, Pearson, New Jersey

*ONE-WEEK INTERNSHIP*  
**AUTONOMOUS ROBOTICS (310 036)**  
PROF. GREGOR SCHÖNER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	<b>2019, FEBRUARY 11 – 15</b> (Preliminary meeting: 2019, February 7, 10.15h, NB 3/57)
<b>ROOM:</b>	NB 2/77
<b>CP:</b>	3

The practical course gives an introduction to mobile robotics with a focus on dynamical systems approaches. In the exercises, the computing environment Matlab is used to control e-puck miniature mobile robots, equipped with a differential drive, combined infrared/proximity sensors and a video camera. The course covers elementary problems in robot odometry, use of sensors and motor control. It then teaches basic dynamic methods for robot navigation, in which the robot's sensors are used for obstacle avoidance and approach to a target location.

Interested students who do not have experience in Matlab should attend the Matlab introduction of the lab exercise Introduction to Deep Learning for Computer Vision (typically the week before this course, for exact time and place, contact [sebastian.houben@ini.rub.de](mailto:sebastian.houben@ini.rub.de)).

Enrollment: 01.12.2017 – 12.01.2018 e-mail: [mathis.richter@ini.rub.de](mailto:mathis.richter@ini.rub.de)

*SEMINAR***JOURNAL CLUB "LEARNING AND MEMORY" (310 036)**

PROF. SEN CHENG

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Tuesday, 12 – 14 (First Meeting: 16.10.2018)
<b>ROOM:</b>	GA 04/187
<b>CP:</b>	3

We will focus on the neural basis of learning and memory at the systems level. In each session a journal article will be presented by one participant and discussed by all participants. The articles will be selected particularly in the areas of spatial and episodic memory. They will focus on the functional role of the mammalian hippocampus in these processes and include a diverse set of approaches: electrophysiology, imaging, computational modeling, and robotics.

Contact: Prof. Sen Cheng, NB 3/33, [sen.cheng@rub.de](mailto:sen.cheng@rub.de)

Office hours: Thursdays 14:00-15:00 (Cheng)

Credits: 3 CP

Capacity: max. 15 students

Enrollment: VSPL

**14.**

14. Cognitive Neuroscience

*COLLOQUIUM***BIOPSYCHOLOGY RESEARCH COLLOQUIUM (118 914)**

PROF. ONUR GÜNTÜRKÜN

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Monday, 13.00 – 15.00 (First Meeting: 08.10.2018 – t.b.a.)
<b>ROOM:</b>	IB 6/127
<b>CP:</b>	3 (obligatory essay on one of the presented topics)

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/>

**14.**

Cognitive Neuroscience

*COLLOQUIUM***THEMEN DER KOGNITIVEN NEUROWISSENSCHAFT (118 711)**PROF. ONUR GÜNTÜRKÜN, PROF. OLIVER WOLF,  
PROF. NIKOLAI AXMACHER

<b>TERM:</b>	Winter 2018/19
<b>MEETING TIME:</b>	Friday, 10.00 – 12.00 (First meeting: 19.10.2018)
<b>ROOM:</b>	IA 1/87
<b>CP:</b>	3

In dieser Veranstaltung werden laufende Forschungsprojekte, die sich für eine M.Sc. Arbeit eignen, vorgestellt. Ein zentrales Lernziel dieser Veranstaltung - und damit auch Grundlage für die erfolgreiche Teilnahme und Leistungsbewertung - ist die regelmäßige aktive Beteiligung am wissenschaftlichen Diskurs. Daher ist eine regelmäßige Anwesenheit im Umfang von mindestens zwei Dritteln der Termine notwendig.

Voraussetzungen: Interesse an neurowissenschaftlicher Master-Arbeit

Literatur: wird in der Veranstaltung bekannt gegeben.