

Course Guide – Master Cognitive Science

Winter 2022/23

Version as of 18.10.2022

FIRST YEAR PROGRAM	2
Preparatory Courses	3
A1. Introduction to Cognitive Science	5
BM. Basic Methods	6
BM1. Experimental Psychology Lab	6
BM2. Logic	7
BM3. Neural Networks	7
BM4. Functional Neuroanatomy	10
C. Topics Selection	11
C1. Social Cognition & Meta-Science	11
C2. Perception & Action	17
C3. Memory, Learning & Decision Making	24
C4. Language, Logic & Categories	32
AM. Advanced Methods	38
AM1. Theory Formation and Conceptual Analysis	38
AM4. Computational Modeling	40
AM5. Special Methods in Neuroscience/Genetics	41
AM7. fMRI Training	45
D1. Free Selection	46
SECOND YEAR PROGRAM	56
I. Interdisciplinary Research Module	56
I1. Cognitive Philosophy	56
I2. Psychology	61
I3. Computational Modeling	65
I4. Cognitive Neuroscience	68

Enrollment for Courses

Students are automatically registered for the preparatory courses. Students have to register for their regular courses via eCampus. All relevant information concerning eCampus (e.g. ID and password) are provided during the enrolment process. If you have any technical problems concerning eCampus please contact the Helpdesk.

Please register for your courses as soon as you receive access to eCampus. The registration deadline is usually at the beginning of October. If you fail to register during this time span, please contact the instructor of the respective course, for example, at the first session. Only the instructors can register you later on.

Please note that some courses will not be available for registration on eCampus. This mainly concerns lectures and seminars offered by the Institute of Neuroinformatics. Again, please attend the first session and talk to the instructor. If a registration via eCampus is not possible, this should be indicated in the Course Guide.

Please remember always to check time, place and CP for your classes in eCampus and/or with the respective course instructor. These details in the course guide are subject to change and for your convenience only.

Essay Writing Course:

One of the basic skills that need to be acquired during the program is the ability to write academic essays. This skill is not taught as one of the Basic Methods. It needs to be acquired during your course work. To do so, each student must write at least one essay in their first year of study, typically in C1 to C4. Students with little or no background in academic writing should write their essay in one of the courses that are sub-labelled "essay writing course". Those courses enable you to write academic texts as it will be needed for your master thesis, conference applications, or job applications.

FIRST YEAR PROGRAM

Every student is strongly recommended to participate in the preparatory courses. 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. The course "Mathematics and Computerscience for Modeling" need not be passed by students with a BA in mathematics or informatics.

Preparatory Courses

Academic English

SEMINAR

ENGLISH FOR MASTER COGNITIVE SCIENCE (251209)

EWA BEHLING

TERM:	Winter 2022/23
MEETING TIME:	September 26 – October 7, 12.30 - 14.30
ROOM:	IA 0/158-79 (PC-Pool 1) (In Person)

This course is directed towards students who have been admitted to the Master of Cognitive Science programme at the Ruhr-University Bochum and who would like to improve their language skills. It offers a fast-paced introduction to Academic English in the field of neuroscience. Topics discussed in class include the anatomy of the central nervous system, with emphasis on the structure and function of the human brain, language and social cognition, learning and memory, as well as aspects of computational neuroscience.

The class format will consist of on-campus meetings and interactive components. It will be accompanied by a Moodle course to enhance classroom teaching and self-study at home.

Throughout the course, students will receive instruction and practice in written and oral communication. The assessment will be based on the following components: an oral presentation, an abstract, and compulsory activities available on Moodle.

Biostatistics

SEMINAR
BIOSTATISTICS (119212)
MARTIN BORDEWIECK

TERM: Winter 2021/22
MEETING TIME: September 26 – October 7, 08.30 - 11.30
ROOM: IA 0/158-79 (PC-Pool 1) (In Person)

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

Informatics and Mathematics

SEMINAR
**MATHEMATICS AND COMPUTER SCIENCE FOR MODELING
(119219)**
DANIEL SABINASZ, M.SC.

TERM: Winter 2021/22
MEETING TIME: September 26 – October 7, 15.00 - 17.30
ROOM: IA 0/158-79 (PC-Pool 1) (In Person)

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

Introduction to Cognitive Science

LECTURE & EXERCISE

INTRODUCTION TO COGNITIVE SCIENCE (LECTURE 119217 & EXERCISE 119218)

PROF. JONAS ROSE, PROF. ALBERT NEWEN, PROF. TOBIAS SCHLICHT, PROF. ONUR GÜNTÜRKÜN, PROF. NIKOLAI AXMA-CHER, PROF. ROBERT SCHMIDT, PROF. MARKUS WERNING, PROF. OLIVER T. WOLF, PROF. GREGOR SCHÖNER, PROF. LAURENZ WISKOTT, PROF. SEN CHENG

TERM:	Winter 2022/23
LECTURE:	Tuesday, 12 – 14 (First Meeting: 11.10.2022)
ROOM:	IA 1/157 and IA 02/461 (exception: first meeting, online)
EXERCISE:	Wednesday, 14 – 16 (First Meeting: 19.10.2022)
ROOM:	GAFO 02/364
CP:	6

Attention:

- Further details of the Lecture and Exercise plan will be announced later.

The lecture introduces the interdisciplinary field of cognitive science in combining philosophy, psychology, computational modeling and neurosciences. The lecture has the aim to deliver important basic knowledge from empirical sciences in the framework of theory formation. For cognitive science students the credit point can only be acquired on the basis of the written examination and it presupposes in addition some active work in the obligatory additional seminar.

The first lecture (11.10.22) will take place via Zoom. The subsequent lectures will take place partly in IA 1/157 and partly in IA 02/461, a schedule will be provided.

Structure of the lecture is subject to changes.

The structure of the lecture:

1. Theoretical Frameworks in Cognitive Science 1
2. Theoretical Frameworks in Cognitive Science 2
3. Cognitive Neuroscience of Perception
4. Theories of Consciousness
5. Cognitive models of semantics and pragmatics
6. Cognitive Neuroscience of Emotion
7. Theories of Emotion
8. Cognitive Neuroscience of Memory
9. Theory of Perception and Cognition
10. Stress
11. Computational approaches to Cognitive Science
12. Models of vision
13. Supervised Learning in Neural Networks
14. Reinforcement Learning in the Brain
15. Exam

BM. Basic Methods

Students are expected to choose (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 the program coordinator (cogsci-info@rub.de) or Prof. Dr. Jonas Rose.

BM1

BM1. Experimental Psychology Lab

SEMINAR

EXPERIMENTAL PSYCHOLOGICAL LAB (119213)

PROF. DR. DIRK SCHEELE

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 10 – 12 (First meeting: 20.10.2021)
ROOM:	IA 1/163
CP:	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 analyse the data.

As a result, all participants will write a first scientific report.

SEMINAR

LOGIC AND PHILOSOPHICAL METHODOLOGY (030088)

JUN. PROF. DR. PETER BRÖSSEL

TERM:	Winter 2022/23
MEETING TIME:	Monday, 12 – 14 (First meeting: 10.10.2022)
ROOM:	GABF 04/358
CP:	6

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.

Literature:

Nolt J., Rohatyn D., Varzi A. 2011. Logic. Schaum's Outlines.

General Remark Concerning BM3 – Neural Networks

A basic course in neural networks is obligatory. Students have to pass only one course in BM3.

If you notice that are not equipped with the necessary mathematical groundwork for the courses offered in the winter semester, make sure to attend the Matlab seminar, only offered in summer semesters.

*LECTURE & EXERCISE***COMPUTATIONAL NEUROSCIENCE – NEURAL DYNAMICS
(212005)**

PROF. DR. GREGOR SCHÖNER

TERM:	Winter 2022/23
LECTURE:	Thursday, 14 – 16 (First meeting: 13.10.2022)
ROOM:	NB 3/57
EXERCISE:	Thursday, 16 – 17 (First meeting: 20.10.2022)
ROOM:	NB 3/57
CP:	6

This is the standard course for the BM3 Module. But it requires quite some math preparation, typically as covered in two semesters of higher mathematics (functions, differentiation, integration, differential equations, linear algebra). The course does not make extensive use of the underlying mathematical techniques but uses the mathematical concepts to express scientific ideas. Students without prior training in the relevant mathematics may be able to follow the course but will have to work harder to familiarize themselves with the concepts.

This course lays the foundations for a neurally grounded understanding of the fundamental processes in perception, in cognition, and in motor control, that enable intelligent action in the world. The theoretical perspective is aligned with ideas from embodied and situated cognition but embraces concepts of neural representation and aims to reach higher cognition. Neural grounding is provided at the level of populations of neurons in the brain that form strongly recurrent neural networks and are ultimately linked to the sensory and motor surfaces.

The theoretical concepts on which the course is based come from dynamical systems theory. These concepts are used to characterize neural processes in strongly recurrent neural networks as neural dynamic systems, in which stable activation states emerge from the connectivity patterns within neural populations. These connectivity patterns imply that neural populations represent low-dimensional feature spaces. This leads to neural dynamic fields of activation as the building blocks of neural cognitive architectures. Dynamic instabilities induce change of attractor states from which cognitive functions such as detection, change, or selection decisions, working memory, and sequences of processing stages emerge. The course partially follows a textbook (Dynamic Thinking—A primer on Dynamic Field Theory, Schöner, Spencer, and the DFT research group. Oxford University Press, 2016), of which chapters will serve as reading material. Exercises will focus on hands-on simulation experiments, but also involve readings and the writing of short essays on interdisciplinary research topics. See www.dynamicfieldtheory.org for some of that material. Tutorials on mathematical concepts are provided, so that training in calculus and differential equations is useful, but not a prerequisite for the course.

Please find more information at <https://www.ini.rub.de/teaching/courses/>

*LECTURE & EXERCISE (+TUTORIAL)***ARTIFICIAL NEURAL NETWORKS (212006)**

PROF. DR. SEN CHENG

TERM:	Winter 2022/23
LECTURE:	Monday, 16 – 18 (First meeting: 10.10.2022)
ROOM:	HNC 30
TUTORIAL:	Wednesday, 12 – 14 (First meeting: 12.10.2022)
ROOM:	ID 03/121 CIP-Pool 2
EXERCISE:	Friday, 10 – 12 (First meeting: 14.10.2022)
ROOM:	UFO 0/09
CP:	6

This course needs quite some math preparation including calculus, linear algebra, statistics and programming.

Artificial neural networks (ANN) were inspired by the architecture and function of the brain. Nevertheless, their greatest strength is not that they are good models of the brain, but rather that they are powerful function approximators. Since the 1980's many types of ANN have been developed and tricks for training ANNs on data proliferated. Recent advances in computing hardware and the availability of large datasets have made it possible to train ANNs such that they perform better than humans, e.g. on image recognition. In this class, students will, firstly, gain a theoretical understanding of the principles underlying the methods applied to neural networks and, secondly, learn practical skills in implementing neural networks and applying them for data analysis.

Topics: optimization problems, regression, logistic regression, biological neural networks, model selection, universal approximation theorem, perceptron, MLP, backpropagation, deep neural networks, recurrent neural networks, LSTM, Hopfield network, Boltzmann machine

Software: python, numpy, scipy, matplotlib, scikit-learn, tensorflow

There will be a written examination at the end of the course.

Prerequisites: Calculus, linear algebra, statistics, programming.

Registration: Please register via moodle: <https://moodle.ruhr-uni-bochum.de/m/course/view.php?id=>

*LECTURE***CLINICAL NEUROPSYCHOLOGY (112621)**

PROF. DR. BORIS SUCHAN

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 10 – 12 (First meeting 18.10.2021)
ROOM:	IA 02/461
CP:	3

The aim of the lecture is to introduce basic concepts of clinical neuropsychology. First of all, all methods used in human neuropsychological brain behavior research will be discussed. This is followed by an overview of the organization of the human brain, the structure and function of frontal, temporal, parietal and occipital lobes. Furthermore, the lecture deals with all neuropsychological syndromes that can be observed after brain damage. Assessment of neuropsychological functions will also be covered in this lecture.

Literature:

B. Kolb & I.Q. Whishaw (1996). Fundamentals of Human Neuropsychology. New York: Freeman.

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

C. Topics Selection

Remarks for Essay Writing

For all students who need to learn how to write an essay or still feel insecure about it, we recommend in the winter term the following two seminars:

“Perceptual Learning” by Dr. Alfredo Vernazzani: It can be evaluated as C2, C3 or AM1 course.

“Short format scientific writing” by Dr. Lukas Hahn and Dr. William Clark.
It can be evaluated as C2 or C3 course.

C1

Social Cognition & Meta-Science

LECTURE

PHILOSOPHY OF COGNITIVE SCIENCE (030011)

PROF. DR. TOBIAS SCHLICHT

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 12 – 14 (First meeting: 13.10.2022)
ROOM:	HGA 30
CP:	3 or 6

This lecture series offers an introduction to some of the central topics in Philosophy of Cognitive Science, focusing on explanatory paradigms (classical cognitivism, enactivism, predictive processing), cognitive phenomena (intentionality, consciousness, free will, artificial intelligence) and central notion like representation, computation.

Accompanying literature for the course:

Young, B., Dicey Jennings, C. (eds.) (2022) *Mind, Cognition and Neuroscience. A philosophical introduction*. London: Routledge.

*BLOCK SEMINAR***INTRODUCTION TO PHILOSOPHY OF BIOLOGY****(030101)**

JUN.PROF. DR. JAN BAEDKE

TERM:	Winter 2022/23
MEETING TIME:	Preparatory Meeting: 17.11.2022, 10 - 12 Block: 06.02. – 09.02.2023, 10 – 16
ROOM:	GABF 04/352
CP:	3 or 6

In the last decades, philosophy of science has moved on from the prevalent idea that physics constitutes the paradigmatic example of science. As a consequence, other disciplines became objects of philosophical investigations. This especially holds for biology, or the life sciences more generally, which many consider to become the leading science of the 21st century. Philosophy of biology is a relatively young and lively discipline. It deals with the conceptual and ontological foundations as well as the epistemic and methodological frameworks of the biosciences and (bio)medical sciences. It addresses questions like: What do central concepts like 'selection', 'adaptation', 'organism', or 'environment' actually mean? What is biological information or the unit of selection (the gene, organism or species)? What is the structure and character of explanations and theories in biology compared to other disciplines? Do genes determine our actions or do we control the actions of our genes? What is a biological individual, and are humans special ones? How does the social relate to the biological? What does/should the concept of race refer to? By drawing on these and other topics the seminar will provide an introduction to central questions and problems in today's philosophy of biology. In the seminar recent English publications in the field will be read and discussed. To pass the course, students must participate in the preliminary meeting (17.11.2022), actively partake in the discussions, and conduct a presentation (or take other course activities). No particular knowledge in biology is required.

Literature:

Griffiths, Paul (2011): Philosophy of Biology. In: Zalta, Edward N. (eds.): The Stanford Encyclopedia of Philosophy (Summer 2011 Edition). <https://plato.stanford.edu/archives/sum2011/entries/biology-philosophy/>

[Online available; preparation literature]

Okasha, S (2019): Philosophy of Biology: A Very Short Introduction. Oxford: Oxford University Press.

Griffiths, Paul & Sterelny, Kim (1999): Sex and Death: An Introduction to Philosophy of Biology. Chicago: University of Chicago Press.

Krohs, Ulrich & Toepfer, Georg (eds.) (2005): Philosophie der Biologie. Eine Einführung. Frankfurt/M.: Suhrkamp. [German Edition]

C1**C1. Social Cognition & Meta-Science***SEMINAR***EXPERIENTIAL KNOWLEDGE AND EXPERTISE (030081)**

DR. ROY DINGS

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 12 – 14 (First meeting: 11.10.2022)
ROOM:	GABF 04/358
CP:	3 or 6

Many people have the intuition that undergoing a particular experience may lead to unique and important insights. This intuition has important ramifications for several societal domains including mental health care. For instance, it suggests that someone who has experienced depression has unique and important insights into depression. In this seminar we will draw on philosophical research to critically evaluate this intuition and its ramifications. In particular we will investigate three main components associated with this trend: Experience, Knowledge and Expertise. Questions to be addressed include: what sort of knowledge (if any) can be derived from particular experiences? How does this knowledge relate to other forms of knowledge, e.g. scientific knowledge? What elements of experience (e.g. its phenomenality) form the basis for such knowledge? What are the characteristics of the kind of expertise that is presupposed in recent mental health care developments?

Students can receive 3 CP ungraded or 6 CP graded.

C1**Social Cognition & Meta-Science***COLLOQUIUM***LECTURE SERIES 'HISTORY AND PHILOSOPHY OF THE LIFE SCIENCES' (030134)**

JUN.PROF. DR. JAN BAEDKE

TERM:	Winter 2022/23
MEETING TIME:	Monday, 16 – 18 (First Meeting: 10.10.2022)
ROOM:	GA 03/149
CP:	3

In this lecture series current topics in the history and philosophy of the life sciences will be discussed. The lecture series will host talks by international leading experts and local researchers, including philosophers and

historians, but also social scientists and scientists. Participants will have the opportunity to present their master and doctoral theses. For students who want to receive course credits, please register via eCampus. Talks will be given in English and online (via Zoom). They will be announced on: <https://rotorub.wordpress.com/roto-lecture-series/>

*BLOCK SEMINAR***FACT-CHECKING OF SCIENTIFIC CLAIMS: A PHILOSOPHY OF SCIENCE PERSPECTIVE (030065)**

PROF. DR. DUNJA SESELJA

TERM:	Winter 2022/23
MEETING TIME:	Block: 23.10.22, 04.12.22, 28.01.23, 10 - 16
ROOM:	4/20 in Wasserstr. 221 (possibly hybrid)
CP:	3 or 6

Contemporary social discourse has been flooded by fake news, echo-chambers, epistemic bubbles and other epistemically pernicious processes. Scientifically relevant information has not been spared: from 'anti-vaxxers' to climate-change deniers, disinformation has also had an effect on scientifically relevant news.

To combat such issues, social media have introduced the practice of 'fact-checking'. However, fact-checking of scientific claims can be challenging. To begin with, neither does the frontier of scientific research typically produce 'facts', nor can such claims easily be 'checked'. Ongoing inquiry, often pervaded by scientific disagreements and controversies, is characterized by incomplete or conflicting evidence, and hence by a high degree of risk and uncertainty. At the same time, an unhinged spread of false or deceptive information can easily have numerous harmful consequences, including the loss of public trust in science. In this course we will start from the philosophical discussions on the evaluation of scientific hypotheses, and the role of values in scientific inquiry. In addition, we will look into recent controversies surrounding the fact-checking of scientific claims. Throughout the course, students will work in teams, where each team will choose a case-study to research. The result of the research will be presented in the final block. The course will consist of three blocks, to be held on Saturdays (the first block will be held in late October; the exact date will be agreed upon via email). In addition, teams will have coaching sessions in between the blocks.

23.10, 04.12., 28.01., 10:00-16:00

Beside these three blocks, students will also have tutoring sessions in between the blocks, which will be agreed upon at the start of the seminar.

SEMINAR

MINIMAL MODELS OF CONSCIOUSNESS (030102)

DR. WANJA WIESE

TERM:	Winter 2022/23
MEETING TIME:	Wednesday 14 – 16 (First Meeting: 12.10.2022)
ROOM:	GABF 04/609
CP:	3 or 6

Despite much progress in the science of consciousness, the field is far from finding a consensus on even fundamental questions and problems. This can be seen by considering how many competing theories of consciousness there are, and how difficult it is to test and empirically compare them.

On the one hand, a plausible reaction to this situation is to try and make theories more specific and to derive empirically testable predictions that can differentiate between theories of consciousness. On the other hand, the need to determine whether non-human animals (and, potentially, artificial systems) are conscious, seems to require more general, minimalist approaches, that abstract away from the specific neuronal mechanisms underlying consciousness in human beings.

In this seminar, we will first gain an overview over major theoretical approaches in the science of consciousness. Then we will investigate how to taxonomise minimalist approaches and how to assess their specific virtues. Finally, we will explore ways in which the relationship between minimal models and theories of consciousness can be conceived: are they independent, complementary, or in opposition?

Literature:

Birch, J. (2022). The search for invertebrate consciousness. *Noûs*, 56(1), 133–153.

<https://doi.org/10.1111/nous.12351>

Metzinger, T. (2020). Minimal phenomenal experience. *Philosophy and the Mind Sciences*, 1(1), 1–44.

<https://doi.org/10.33735/phimisci.2020.1.46>

Seth, A. K., & Bayne, T. (2022). Theories of consciousness. *Nature Reviews Neuroscience*, 1–14.

<https://doi.org/10.1038/s41583-022-00587-4>

Wiese, W. (2020). The science of consciousness does not need another theory, it needs a minimal unifying model. *Neuroscience of Consciousness*, 2020(1), niaa013. <https://doi.org/10.1093/nc/niaa013>

Students can receive 3 CP for active attendance or 6 CP for active attendance and examination.

C1

Social Cognition & Meta-Science

*SEMINAR***APPLIED SOCIAL PSYCHOLOGY (112541)****[ANGEWANDTE SOZIALPSYCHOLOGIE]**

DR. VLADIMIR PONIZOVSKIY

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 14 – 16 (First Meeting: 18.10.2022)
ROOM:	IA 1/87
CP:	3

In this seminar, the students will learn about the fundamental theories and recent developments in psychological approaches to attitude and behavioral change. For the final project, students will use that knowledge to prepare a psychological intervention applicable to a real-world issue.

Literature: Relevant papers will be uploaded to Moodle

C1

Social Cognition & Meta-Science

*BLOCK SEMINAR***APPLIED SOCIAL PSYCHOLOGY II (PART 1 & 2)****(117433 & 117434)**

DR. LUSINE GRIGORYAN

TERM:	Winter 2022/23
MEETING TIME:	Preparatory meeting: 19.10.2022, 16 – 18 via Zoom Block: 16., 17., 18.12. (Fr- So), 10 – 18
ROOM:	IA 1/87
CP:	6

This course consists of two seminars which must be taken together.

In this seminar, students will apply psychological theories of behavioral change, persuasion, and social influence to various pressing social issues. Students can work on an issue they find most important or interesting, from sustainability to entrepreneurship to migrant integration and sexism. Students will work in groups and can choose one of the three formats for their group project: a media campaign, a psychological intervention, or a policy proposal. The final project should be submitted as a written proposal and presented as a pitch for a hypothetical governmental body or an NGO that might fund your project

*LECTURE***LEFT BRAIN - RIGHT BRAIN (118111)**

PROF. DR. PHIL. DR. H.C. ONUR GÜNTÜRKÜN

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 14 – 16 (First Meeting: 18.10.2022)
ROOM:	HIA
CP:	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

AGENT-BASED SIMULATIONS IN PHILOSOPHY (030064)

PROF. DR. DUNJA SESELJA, PROF. DR. CHRISTIAN STRÄBER

TERM:	Winter 2022/23
MEETING TIME:	Friday, 14 – 16 (First meeting: 14.10.2022)
ROOM:	GABF 04/358 (possibly hybrid)
CP:	3 or 6

In recent years digital aspects have entered philosophy, both in terms of providing a plethora of new topics and by providing new perspectives on old questions. Moreover, the digital age also equips philosophy with new computational methods for tackling philosophical questions, such as computer simulations. This course is dedicated to this topic.

Computer simulations in the form of agent-based models (ABMs) have in recent years become a popular method in philosophy, particularly in social epistemology, philosophy of science and political philosophy. In this course we discuss some of the central philosophical questions studied by means of ABMs. For instance, can groups of rational agent polarize, if yes, under which conditions? Can groups composed of agents that reason individually fully rationally (e.g., according to Bayesian standards) still be inefficient as a group? If yes, how so? Other topics concern questions from social epistemology and philosophy of science, such as the division of cognitive labor, cognitive diversity and expertise, opinion dynamics, etc. The course will cover some of the most prominent modeling frameworks used in the philosophical literature and beyond.

Moreover, we will critically discuss the epistemic status of such models. For instance, given their often highly idealized nature, one may critically ask whether these models provide any, and if so, which kind of insights and explanations.

Literature: The reading list will be provided during the course.

SEMINAR, ESSAY WRITING COURSE
PERCEPTUAL LEARNING (030111)
DR. ALFREDO VERNAZZANI

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 10 – 12 (First meeting: 13.10.2022)
ROOM:	GABF 05/707
CP:	3 or 6

This is an Essay Writing Course in Philosophy:

For all students who did not study philosophy during the BA program but need to learn how to write an essay or still feel insecure about it, we recommend in the winter semester the seminar of Dr. Alfredo Vernazzani.

This course can be used either in module C2, C3, or in module AM1.
Students can receive either 3 CP ungraded or 6 CP graded.

Recent studies in philosophy and psychology suggest that our perceptual capacities and experiences are not biologically fixed but can, to some extent, be modified through training and other factors. Typically, *perceptual learning* is defined as an acquired long-lasting capacity to differentiate or discriminate among similar stimuli, unitize or “chunk” different elements into a single unit, or attentional tuning. This interesting phenomenon raises, however, a number of questions: Are the changes genuinely perceptual or rather cognitive? What is the role of attention in perceptual learning? How should we interpret perceptual learning in relation to the perception/cognition divide? Instances of perceptual learning are usually considered as positive acquisitions that lead to better task-performances, but can perceptual learning also have negative side-effects? With the aid of some key texts in philosophy and psychology, we will discuss different aspects of perceptual learning.

Literature:

Learning material will be made available on Moodle by the course instructor.

Recommended for introduction:

Adrienne Prettyman (2019) “Perceptual Learning” WIREs Cognitive Science 10, e1489.
<https://doi.org/10.1002/wcs.1489>.

SEMINAR

**PERCEPTION IN THE CONTEXT OF ACTION AND COGNITION
(030116)**

PROF. DR. ALBERT NEWEN

TERM:	Winter 2022/23
MEETING TIME:	Monday, 16 – 18 (First meeting: 10.10.2022)
ROOM:	GA 04/187 and online via Zoom
CP:	3 or 6

The key question is: What is the nature of perception? We start with an overview of different theoretical approaches characterizing perception either (a) as an input module which should be separated from cognition and action (the so-called sandwich model) or (b) as an ability which is coupled with action such that we always need to account for interdependencies of perception-action and cognition (coupling model). After clarifying the theoretical framework we focus on discussing different central dimensions of perception: (1) the phenomenological perspective: What is constitutive of visual perception? What is its relation to touch? What is the difference between perception and imagination? And what the one between picture perception and ordinary perception of objects in the flesh? What is perceptual presence? (2) the perception-action interdependence: How does perception guide action? Does action influence perception? Can perception be a form of action? How do we spot affordances, i.e. action possibilities? (3) The cognition-perception interdependence: Is perception decoupled from (higher-order) cognition like beliefs, desires, conceptual representations? Can it be shaped or influenced by cognition (cognitive penetration)? At what level does this influence occur? The seminar aims to discuss these three systematic perspectives and provide an overview of the recent debates.

Furthermore, students will receive a systematic overview of the empirical evidences concerning the phenomenon of perception including perceptual illusions. This enables us to develop a philosophical analysis which is empirically anchored. For MA Cogn. Science-Students this is especially helpful.

The seminar will be offered as hybrid course (participation for a certificate can be fully online).

*LECTURE & EXERCISE (+TUTORIAL)***ARTIFICIAL NEURAL NETWORKS (212006)**

PROF. DR. SEN CHENG

TERM:	Winter 2022/23
LECTURE:	Monday, 16 – 18 (First meeting: 10.10.2022)
ROOM:	HNC 30
TUTORIAL:	Wednesday, 12 – 14 (First meeting: 12.10.2022)
ROOM:	ID 03/121 CIP-Pool 2
EXERCISE:	Friday, 10 – 12 (First meeting: 14.10.2022)
ROOM:	UFO 0/09
CP:	6

This course needs quite some math preparation including calculus, linear algebra, statistics and programming.

Artificial neural networks (ANN) were inspired by the architecture and function of the brain. Nevertheless, their greatest strength is not that they are good models of the brain, but rather that they are powerful function approximators. Since the 1980's many types of ANN have been developed and tricks for training ANNs on data proliferated. Recent advances in computing hardware and the availability of large datasets have made it possible to train ANNs such that they perform better than humans, e.g. on image recognition. In this class, students will, firstly, gain a theoretical understanding of the principles underlying the methods applied to neural networks and, secondly, learn practical skills in implementing neural networks and applying them for data analysis.

Topics: optimization problems, regression, logistic regression, biological neural networks, model selection, universal approximation theorem, perceptron, MLP, backpropagation, deep neural networks, recurrent neural networks, LSTM, Hopfield network, Boltzmann machine

Software: python, numpy, scipy, matplotlib, scikit-learn, tensorflow

There will be a written examination at the end of the course.

Prerequisites: Calculus, linear algebra, statistics, programming.

Registration: Please register via moodle: <https://moodle.ruhr-uni-bochum.de/m/course/view.php?id=>

*ONE-WEEK PRACTICAL COURSE***AUTONOMOUS ROBOTICS (212401)**

PROF. DR. RER. NAT. GREGOR SCHÖNER

TERM:	Winter 2022/23
MEETING TIME:	27.02.23 – 03.03.23, Mo – Fr: 09 - 17
ROOM:	NB 02/77
CP:	3

This course can be used either in module C2 or in module I3.

The practical course gives an introduction to mobile robotics with a focus on dynamical systems approaches. The open-source simulation environment Webots 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.

The practical part of the lab course consists of a week of full-time work in which students solve programming tasks with simulated mobile robots. The students then write reports in which they describe and analyze the work they have done. The grade for the lab course is based on both the practical work and the report. Students will get support during programming.

Requirements: 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).

Enrollment: Limited number of participants! Please enroll:

- at www.ini.rub.de (enrollment period: October 4 to November 14, 2022) and
- with your examination office or by FlexNow (enrollment period: December 1, 2022 to January 13, 2023)

*BLOCK SEMINAR, ESSAY WRITING COURSE***SHORT FORMAT SCIENTIFIC COMMUNICATION (112916)**

PROF. DR. JONAS ROSE, DR. WILLIAM CLARK, DR. LUKAS HAHN

TERM:	Winter 2022/23
MEETING TIME:	Block: February 2023, exact dates tba
ROOM:	tba
CP:	3

This is an Essay Writing Course in Psychology:

For all students who would like to intensify their knowledge in scientific writing, for example as preparation for further essays or theses, we recommend the class by Dr. William Clark and Dr. Lukas Hahn.

This course can be used either in module C2 or in module C3.

Effective writing is one of the most important skills in today's science, engineering, and business landscapes. Effectively communicating the value of your research can make the difference between if they are funded and accepted for publication or not.

What research means to scientific experts in the field vs. a broad public audience requires very different communication approaches. Communicating the value of research is a critical skill that will enable you to apply these skills from an early stage of your career.

During the science writing course, a combination of seminars that encourage group discussion will explore current topics at the cutting edge of research in working memory and visual neuroscience. Assessments designed to replicate the requirements of academia will help you hone the skills learned to become an effective scientific writer.

Registration is limited to 10 students.

There will be two weeks with two days block seminar each. The seminar will take place around 1 – 4 pm.

The exact dates will be discussed with the registered students.

*SEMINAR***DISKURS NEUROPSYCHOLOGIE: WHAT IS A MEMORY REPRESENTATION? (118613)**

DR. MARKUS WERKLE-BERGER

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 10 – 12
ROOM:	Online via Zoom
CP:	3

What is a memory representation? In 1904, Richard Semon introduced the term "engram" to describe the neural substrate for storing memories in the brain. According to this view, an experience engages a subset of cells that undergo off-line, persistent chemical and/or physical changes to form a long-lasting representation of this experience. Reactivation of the very same set of neurons is supposed to induce memory retrieval. Semon's contributions were largely ignored during his lifetime. However, new technological and methodological advances allow the study of memory representations with an unprecedented level of detail? However, it is still debated what exactly constitutes a memory representation, how they allow the formation of large sets of interconnected knowledge, how the brain solves the stability-plasticity trade-off, and how memory representations actually guide adaptive behavior in an ever-changing environment. The present discurs will target the core question by discussing seminal ideas about how memories are formed, maintained and potentially forgotten in neural networks, like the human brain. The literature based work will be accompanied by discussions of talks delivered by leading experts in the field.

*SEMINAR***THE EVOLUTION OF HIGHER COGNITIVE FUNCTIONS IN
NON-HUMAN ANIMALS (112615)**

DR. MINA KHODADADI

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 14 – 16
ROOM:	IA 1/157
CP:	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.

*BLOCK SEMINAR, ESSAY WRITING COURSE***SHORT FORMAT SCIENTIFIC COMMUNICATION (112916)**

PROF. DR. JONAS ROSE, DR. WILLIAM CLARK, DR. LUKAS HAHN

TERM:	Winter 2022/23
MEETING TIME:	Block: February 2023, exact dates tba
ROOM:	tba
CP:	3

This is an Essay Writing Course in Psychology:

For all students who would like to intensify their knowledge in scientific writing, for example as preparation for further essays or theses, we recommend the class by Dr. William Clark and Dr. Lukas Hahn.

This course can be used either in module C2 or in module C3.

Effective writing is one of the most important skills in today's science, engineering, and business landscapes. Effectively communicating the value of your research can make the difference between if they are funded and accepted for publication or not.

What research means to scientific experts in the field vs. a broad public audience requires very different communication approaches. Communicating the value of research is a critical skill that will enable you to apply these skills from an early stage of your career.

During the science writing course, a combination of seminars that encourage group discussion will explore current topics at the cutting edge of research in working memory and visual neuroscience. Assessments designed to replicate the requirements of academia will help you hone the skills learned to become an effective scientific writer.

Registration is limited to 10 students.

There will be two weeks with two days block seminar each. The seminar will take place around 1 – 4 pm.

The exact dates will be discussed with the registered students.

C3

Memory & Learning

*BLOCK SEMINAR***WORKING MEMORY AND COGNITIVE CONTROL (118921)**

PROF. DR. JONAS ROSE, DORIAN RÖDERS, M.SC.

TERM:	Winter 2022/23
MEETING TIME:	06.03.2023 - 10.03.2023 Preliminary Meeting: 20.02.2023, 11am (Zoom)
ROOM:	GA 04/187
CP:	3

This course will cover Working Memory and Cognitive Control from different viewpoints. The students will learn theoretical concepts of both and learn to distinguish working memory from other memory models. One emphasis of the course is the neuronal basis of these concepts. We will talk about measurement techniques and experimental design. There will be a practical exercise in experimental design as well. A second focus will be the comparison of working memory and cognitive control between birds and mammals. We will also discuss current research papers in those areas, which will be presented by the students.

C3

C3. Memory, Learning & Decision Making

*SEMINAR***DISCOURSE NEURAL BASIS OF LEARNING (118665) [DISKURS]**

PROF. DR. JONAS ROSE

TERM:	Winter 2022/23
MEETING TIME:	Monday, 9 - 11 (First Meeting: 17.10.2022)
ROOM:	GA 04/187
CP:	3

Current literature in cognitive neuroscience will be presented and discussed in depth. We aim to follow up on novel approaches, interesting angles and to have a critical discussion of research methods and interpretations.

Maximum number of participating students: 10

SEMINAR

MEMORY AND IMAGINATION (030106)

PROF. DR. MARKUS WERNING

TERM:	Winter 2022/23
MEETING TIME:	Wednesday 14 – 16 (First Meeting: 12.10.2022)
ROOM:	GA 04/187
CP:	3 or 6

The Philosophy of Memory can be traced back as early as Plato who postulated memory traces by likening memory to the imprints of sense impressions on a wax tablet. The current philosophical debate on memory is dominated by two camps. On one side, we face the Causal Theory that holds on to the idea that remembering requires a memory trace that causally links the event of remembering to the event of perception and carries over representational content from the content of perception to the content of remembering (Martin & Deutscher, 1966). On the other side, a new camp of Simulationists is currently forming up, spearheaded by Michaelian (2016) and Addis (2018). They argue that remembering is nothing, but a specific form of imagination. As a third option, Werning (2020) has developed an account of minimal traces devoid of representational content. It exploits an analogy to a predictive processing framework of perception and also accounts for the different perspectives one can assume in memories (Peeters, Cosentino, & Werning, 2022).

The seminar will provide an overview of the current research literature on memory and imagination, in philosophy, psychology and neuroscience. Students will have the opportunity to link up with our DFG research group “Constructing Scenarios of the Past”.

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

Literature:

- Addis, D. R. (2018). Are episodic memories special? On the sameness of remembered and imagined event simulation. *Journal of the Royal Society of New Zealand*, 48, 64–88.
- Martin, C. B., & Deutscher, M. (1966). Remembering. *Philosophical Review*, 75, 161–196.
- Michaelian, K. (2016). *Mental Time Travel: Episodic Memory and Our Knowledge of the Personal Past*. Cambridge, MA: MIT Press.
- Peeters, A., Cosentino, E., & Werning, M. (2022). Constructing a wider view on memory - Beyond the dichotomy of field and observer perspectives. In A. Berninger & Í. V. Ferran (Eds.), *Memory and Imagination*. London: Routledge.
- Werning, M. (2020). Predicting the Past from Minimal Traces: Episodic Memory and its Distinction from Imagination and Preservation. *Review of Philosophy and Psychology*, 11, 301–333.
- Merleau-Ponty, M. (2012). *Phenomenology of perception*. Trans. D. E. Landes. New York: Routledge.
- Proust, M. (1971). “Contre Sainte-Beuve” (CSB), précédé de Pastiches et mélanges et suivi de Essais et articles, Paris: Gallimard.
- Ricoeur, P. (2003). “Narrative Identity”, in Wood, D. (eds.), *On Paul Ricoeur. Narrative and Interpretation*, London and New York: Routledge.

SEMINAR

**TOPICS IN DEEP LEARNING FOR SEQUENCE PROCESSING
(212101)**

DR. ANAND SUBRAMONEY

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 14 – 16 (First meeting: 12.10.2022)
ROOM:	Online
CP:	3

Natural language processing, robotics, video processing, stock market forecasting and other similar tasks require models that can deal with sequence data and understand temporal dependencies. Two major classes of models that have been designed to deal with sequence data are recurrent neural networks (RNNs/LSTMs) and transformer architectures. Designing and understanding these models is a very active and diverse area of research. Applications of these models are also widespread. The recent explosion of interest in topics such as language modelling and machine translation is based on advances in these models which includes GPT-3, DALL-E, etc.

In this course you'll first understand the fundamentals of recurrent neural networks and transformers that led to these breakthroughs. Then we'll go through and discuss both seminal and recent research papers on these topics to throw light on algorithms and challenges in this field.

The allocation of the limited seminar places (24) is done via the Moodle course <https://moodle.ruhr-uni-bochum.de/enrol/index.php?id=47628> for the corresponding semester. Registration for the winter semester is possible until 10.10.2022. Please enter your degree program in the comment field.

Requirements:

We expect a solid level of mathematics as taught in the Applied Computer Science Bachelor's. Tools commonly used in machine learning are

- basic probability theory/statistics (expectations, variance, foundational distributions and densities, markov chains)
- linear algebra (matrices, vectors, eigenvalues/eigenvectors)
- calculus (functions, derivatives/gradients, simple integrals)

*SEMINAR***JOURNAL CLUB: LEARNING AND MEMORY (212103)**

PROF. DR. SEN CHENG

TERM:	Winter 2022/23
MEETING TIME	Tuesday, 14 – 16 (First Meeting: 11.10.2022)
ROOM:	Online
CP:	3

We will focus on the neural basis of learning and memory at the systems level. In each (online) 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

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

Capacity: max. 15 students

Enrollment: VSPL

C3

Memory & Learning

SEMINAR ESSAY WRITING

PERCEPTUAL LEARNING (030111)

DR. ALFREDO VERNAZZANI

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 10 – 12 (First meeting: 13.10.2022)
ROOM:	GABF 05/707
CP:	3 or 6

This is an Essay Writing Course in Philosophy:

For all students who did not study philosophy during the BA program but need to learn how to write an essay or still feel insecure about it, we recommend in the winter semester the seminar of Dr. Alfredo Vernazzani.

This course can be used either in module C2, C3, or in module AM1.
Students can receive either 3 CP ungraded or 6 CP graded.

Recent studies in philosophy and psychology suggest that our perceptual capacities and experiences are not biologically fixed but can, to some extent, be modified through training and other factors. Typically, *perceptual learning* is defined as an acquired long-lasting capacity to differentiate or discriminate among similar stimuli, unitize or “chunk” different elements into a single unit, or attentional tuning. This interesting phenomenon raises, however, a number of questions: Are the changes genuinely perceptual or rather cognitive? What is the role of attention in perceptual learning? How should we interpret perceptual learning in relation to the perception/cognition divide? Instances of perceptual learning are usually considered as positive acquisitions that lead to better task-performances, but can perceptual learning also have negative side-effects? With the aid of some key texts in philosophy and psychology, we will discuss different aspects of perceptual learning.

Literature:

Learning material will be made available on Moodle by the course instructor.

Recommended for introduction:

Adrienne Prettyman (2019) “Perceptual Learning” WIREs Cognitive Science 10, e1489.
<https://doi.org/10.1002/wcs.1489>.

SEMINAR

**SPEAKING ABOUT SPEECH: ON THE VARIETIES OF QUOTATION
(030112)**

PROF. DR. MARKUS WERNING

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 12 – 14 (First Meeting: 13.10.2022)
ROOM:	GA 04/187
CP:	3 or 6

It has been noticed since antiquity that speaking about speech leads to very puzzling problems in philosophy, logic, linguistics, literature studies, and cognitive science. The famous liar paradox is only one of them. There are many varieties of quotation in natural language, ranging from pure quotation ("Man" has three letters) and direct quotation ("That's ridiculous," said Mary) to indirect discourse (Mary said that that was ridiculous) and the ubiquitous phenomenon of "mixed quotation" – Mary said that that's "ridiculous" (Cappelen & Lepore, 2007). It however also includes less well studied phenomena like scare quotes, free indirect discourse (Maier, 2015), protagonist projection and the role shift in sign language. In a wider sense even psychological phenomena like introspection or second-order thoughts might be regarded as quotations of one's own thoughts in thought (Werning, 2010).

Over the past twenty years it has become increasingly clear that quotation challenges fundamental assumptions about (i) the semantics-pragmatics interface, (ii) the use-mention dichotomy, (iii) the nature of context shift (Recanati, 2010); and (iv) compositionality (Werning, 2005). In the seminar we will address these issues and try to close up with contemporary debates in research.

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

Literature

Cappelen, H., & Lepore, E. (2007). *Language Turned on Itself: The Semantics and Pragmatics of Metalinguistic Discourse*. Oxford: Oxford University Press.

Maier, E. (2015). Quotation and Unquotation in Free Indirect Discourse. *Mind & Language*, 30, 345–373.

Recanati, F. (2010). *Truth-Conditional Pragmatics*. Oxford University Press. doi:10.1093/acprof:oso/9780199226993.001.0001

Werning, M. (2005). Right and wrong reasons for compositionality. In M. Werning, E. Machery, & G. Schurz (Eds.), *The Compositionality of Meaning and Content* (Vol. I, pp. 285–309). Frankfurt: Ontos Verlag.

Werning, M. (2010). Descartes discarded? Introspective self-awareness and the problems of transparency and compositionality. *Consciousness and Cognition*, 19, 751–761.

*BLOCK SEMINAR***SOCIAL PSYCHOLOGY II - INTERSECTIONALITY / MULTIPLE
SOCIAL GROUP MEMBERSHIPS (112322)****[SOZIALPSYCHOLOGIE II - INTERSEKTIONALITÄT / MULTIPLE
SOZIALE KATEGORIEN]**

TERM:	Winter 2022/23
MEETING TIME:	Preparatory meeting: Tuesday, 11.10.22, 10- 12 block: 19.11. – 20.11.22 (Sa & So), 10 - 18
ROOM:	IA 1/87
CP:	3

In this seminar, we will engage with the topic of intersectionality / multiple social group memberships and look at different social psychological phenomena through this lens. We will consider general theoretical and methodological aspects as well as specific examples. The seminar will include small group presentations prepared by students, as well as interaction and discussion.

SEMINAR

FORMAL EPISTEMOLOGY: DEGREES OF RATIONALITY (030082)

DR. NINA POTH

TERM:	Winter 2022/23
MEETING TIME:	Friday, 10 – 12 (First Meeting: 14.10.2022)
ROOM:	GA 3/143
CP:	3 - 6

This seminar is a study of Julia Staffel's book "Unsettled Thoughts: a theory of degrees of rationality" (2019, OUP). The book investigates the rationality of human reasoning under uncertainty from a normative perspective. It critically evaluates the mainstream approach in formal epistemology, which assesses human reasoning with models of ideally rational agents. However, as psychological research shows, humans are far from being ideal thinkers. Mainstream suggests that the more a thinker's degrees of belief approximate the ideal norms, the better. But what exactly does this mean? What does being closer to ideally rational amount to? Unsettled Thoughts provides novel ways to understand and answer these questions. Staffel argues that rational degrees of belief are more accurate and better at guiding our actions. As a main source of argumentation and to make these answers precise, the book relies on formal tools from epistemology, including Bayesianism.

Participants will learn about cutting-edge research on human (ir)rationality from the perspective of formal epistemology, to systematically analyse and engage with the philosophical arguments in the book, and to develop and clearly present their own views about them in mutual discussions. Knowledge in logic or formal epistemology is recommended but not required. The book does a great job at clarifying complex issues in non-formal terms and with many examples.

Participants will engage partly in self-study, partly in meetings to discuss chapters from the book and complete short assignments in Moodle, where supplementary material will also be made available. To obtain ECTS, participants can give presentations on a chapter of their choice. Participants can receive grades by additionally writing an essay (Hausarbeit). Toward the end of the semester, Professor Staffel will herself visit the seminar and students have the opportunity to directly exchange views with her.

Literature: Staffel, J. (2019). *Unsettled Thoughts: A Theory of Degrees of Rationality*. Oxford University Press.

Students can receive either 3 or 6 CP, by giving a presentation/answering quiz questions (3CP) and/or writing an essay/doing an oral exam (6CP).

*BLOCK SEMINAR***PROPER NAMES (030097)**

PROF. DR. DOLF RAMI

TERM:	Winter 2022/23
MEETING TIME:	Block: 13.02.2023 – 24.02.2023 (Mo – Fr), 14 - 17
ROOM:	GABF 04/354
CP:	3 - 6

Since the pioneering work of Mill, Frege and Russell, proper names are a central topic of (analytic) philosophy. These expressions seem to be, on the one hand, the paradigm example of a singular referring term and they, therefore, represent an important aspect of language-world connections. On the other hand, these expressions are relative to their paradigm use apparently semantically simple, but they have a large number of non-paradigm and puzzling uses. In this lecture, I will provide a mixture of a historical and systematic overview of (a) the most important challenges with respect to the semantics, pragmatics and metaphysics of names and (b) the most important views on proper names in the philosophy of language and linguistics.

Literature:

S. A. Kripke: Naming & Necessity, Blackwell 1980.

F. Recanati: Direct Reference, Blackwell 1993.

M. Sainsbury: Reference without Referents, Oxford, 2005.

D. Rami: Names & Context, Bloomsbury 2021.

SEMINAR

**PHILOSOPHY OF VIRTUALITY: FROM MIRRORS TO THE MATRIX
(030103)**

DR. KRZYSZTOF DOLEGA

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 16 – 18 (First Meeting: 12.10.2022)
ROOM:	GA 3/143
CP:	6

Virtual entities are part of our everyday lives. We interact with them directly in the guise of virtual assistants, virtual machines, or VR helmets, as well as indirectly, by consuming media and participating in the discourse about the possible promises and dangers of virtual realities.

Although our everyday use of the notion of virtuality can be traced all the way back to the beginning of the XX century and the work of Charles Sanders Peirce, the concept itself has received relatively little attention from philosophers in the analytic tradition. Meanwhile, the notion of virtuality explored by Giles Deleuze and other thinkers in the continental tradition has become divorced from our day-to-day use. However, the recent boom in personal technologies employing elements of virtual and augmented reality, the commonplace conception of virtuality has once again become the object of intense scrutiny for philosophers coming from different backgrounds.

The aim of this course is to look at different notions of virtuality across philosophy and technology in order to probe metaphysical and epistemological issues surrounding virtual entities and virtual realities. In particular, we will explore whether it is possible to arrive at one concept of virtuality, which can be legitimately applied across multiple disciplines and contexts.

Some of the questions we will be trying to answer are:

- What does it mean for an entity to be virtual?
- Is the term 'virtual' used in the same way across different disciplines and contexts?
- Are virtual objects, properties, states, experiences real?
- How is/can the notion of virtuality be employed in different branches of philosophy?

Literature:

Metzinger, T. (2018). Why Is Virtual Reality Interesting for Philosophers? *Frontiers in Robotics and AI*, 5: 101. <https://doi.org/10.3389/frobt.2018.00101>

Chalmers, D.J. (2022). *Reality+: Virtual Worlds and the Problems of Philosophy*. W. W. Norton (US) and Allen Lane (UK). Intro and chapter one available here: <http://consc.net/reality+/excerpt.pdf>

Chalmers, D.J. (2022). The Virtual and the Real. *Disputatio*, 9(46): 309-352. <http://consc.net/papers/virtual.pdf>

LECTURE + EXERCISE

FIRST ORDER MODAL LOGIC (030007 & 030109)

DR. NILS KÜRBIS

TERM:	Winter 2022/23
LECTURE:	Tuesday, 16 – 18 (First Meeting: 11.10.2022)
ROOM:	GA 03/142
EXERCISE:	Thursday, 16 – 18 (First Meeting: 13.10.2022)
ROOM:	GA 03/46
CP:	6

Ways the world might have been, what could or could not have been the case, what is contingent, possible, impossible or necessary: these matters enter into almost every area of philosophy. In metaphysics and philosophical logic they are crucial. Modal logic is the framework for dealing with these matters in a precise and systematic way. The course presents various formal systems of propositional and quantified modal logic and possible worlds semantics for them and introduces the technique of modal tableaux to decide modal consistency and validity. Their varying metaphysical presuppositions and commitments will be discussed. We will apply the systems to the analysis of concepts of necessity and possibility important in metaphysics and epistemology: alethic, epistemic, doxastic, deontic, temporal. The notions of existence and essence will come under scrutiny as well as topics relating to the philosophy of language, such as rigid designation and definite descriptions.

The course follows Fitting and Mendelsohn's textbook (see below). Some additional topics, such as natural deduction for modal logic, will also be covered.

Literature:

M. Fitting & R. L. Mendelsohn, *First-Order Modal Logic*, Kluwer Academic Publishers, 1998.
G. E. Hughes and M. J. Cresswell: *An Introduction to Modal Logic*, Routledge, 1996

Please register for the lecture and for the exercise, the courses must be taken together.

Language: the course is planned bilingually but can also be held completely in English if international students are present

AM. Advanced Methods

Advanced methods are usually studied in the second semester. Solely the "fMRI"-course is only offered during the winter term.

Further advanced methods can be found in the program from the last summer semester on our webpage: <https://philosophy-cognition.com/mcs/course-guides/>

There will again be a variety of courses in the upcoming summer semester.

AM1	AM1. Theory Formation and Conceptual Analysis
	SEMINAR, ESSAY WRITING COURSE PERCEPTUAL LEARNING (030111) DR. ALFREDO VERNAZZANI
TERM:	Winter 2022/23
MEETING TIME:	Thursday, 10 – 12 (First meeting: 13.10.2022)
ROOM:	GABF 05/707
CP:	3 or 6

This is an Essay Writing Course in Philosophy:

For all students who did not study philosophy during the BA program but need to learn how to write an essay or still feel insecure about it, we recommend in the winter semester the seminar of Dr. Alfredo Vernazzani.

This course can be used either in module C2, C3, or in module AM1.
Students can receive either 3 CP ungraded or 6 CP graded.

Recent studies in philosophy and psychology suggest that our perceptual capacities and experiences are not biologically fixed but can, to some extent, be modified through training and other factors. Typically, *perceptual learning* is defined as an acquired long-lasting capacity to differentiate or discriminate among similar stimuli, unitize or "chunk" different elements into a single unit, or attentional tuning. This interesting phenomenon raises, however, a number of questions: Are the changes genuinely perceptual or rather cognitive? What is the role of attention in perceptual learning? How should we interpret perceptual learning in relation to the perception/cognition divide? Instances of perceptual learning are usually considered as positive acquisitions that lead to better task-performances, but can perceptual learning also have negative side-effects? With the aid of some key texts in philosophy and psychology, we will discuss different aspects of perceptual learning.

Literature:

Learning material will be made available on Moodle by the course instructor.

Recommended for introduction:

Adrienne Prettyman (2019) "Perceptual Learning" WIREs Cognitive Science 10, e1489.
<https://doi.org/10.1002/wcs.1489>.

SEMINAR

ARGUMENTATION (030066)

PROF. DR. DUNJA SESELJA, PROF. DR. CHRISTIAN STRAßER

TERM:	Winter 2022/23
MEETING TIME:	Friday, 12.00 – 13.30 (First meeting: 14.10.2022)
ROOM:	GABF 04/358 (possibly hybrid)
CP:	3 or 6

Philosophy and science are based on argumentation. Instead of just voicing opinions or stating beliefs, scholars give reasons and provide evidence for their conclusions. Argumentation is key when trying to find a consensus, or at least when identifying the roots of a disagreement. As such, it is central in many areas, from everyday life to political discourse. Needless to say, good argumentative skills are a necessary requirements for successful studies (in essay and thesis writing, for instance).

In this course we will survey different facets of argumentation theory. We start off with foundations (argument schemes such as the Toulmin scheme, fallacy theory, types of arguments, etc.) and proceed towards contemporary investigations (e.g.: computational argumentation; Bayesian and probabilistic argumentation; pragma-dialectics; reasoning and biases; etc.). Finally, we will look into practical applications of argumentation, for example, in the context of structured debating as well as in the context of online debates.

Literature: The reading list will be provided during the course.

PROJECT SEMINAR

**MACHINE LEARNING: UNSUPERVISED METHODS
(212501)**

PROF. DR. LAURENZ WISKOTT

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 10:30 – 13:45 (First Meeting: 11.10.2022)
ROOM:	Online
CP:	9

This course can be used either in module AM4 or in module I3.

This course is given with the *problem based learning* concept. The students work in groups of about 5 on realistic problems that can be solved with unsupervised learning methods from machine learning. They develop hypotheses and strategies for a solution and identify what they need to learn in order to implement these. Thus, the students will not only learn about machine learning but also soft skills.

This course covers a variety of unsupervised methods from machine learning such as principal component analysis, independent component analysis, vector quantization, clustering, Bayesian theory and graphical models.

After the successful completion of this course the students

- know a number of important unsupervised learning methods,
- can discuss and decide which of the methods are appropriate for a given data set,
- understand the mathematics of these methods,
- know how to implement and apply these methods in python,
- have gained experience in organizing and working in a team,
- know problem solving strategies like brain storming,
- can communicate about all this in English.

Exam: As an exam prerequisite (Prüfungsvorleistung) participants have to structure and document their learning progress and contribution to the group work, including setting personal testable milestones. The course is concluded with a ca 20 min graded oral exam. The dates are set at the end of the semester.

Condition for granting the credit points (Voraussetzungen für die Vergabe von Kreditpunkten): Exam prerequisite and passed oral exam

Moodle: <https://moodle.ruhr-uni-bochum.de/m/course/view.php?id=47270>

Requirements: The mathematical level of the course is mixed but generally high, including calculus (functions, derivatives, integrals, differential equations, ...), linear algebra (vectors, matrices, inner product, orthogonal vectors, basis systems, ...), and a bit of probability theory (probabilities, probability densities, Bayes' theorem, ...). Programming is done in Python, thus the students should have a basic knowledge of that as well, or at least be fluent in another programming language.

Literature: For most topics a script will be available

BLOCK SEMINAR

IMAGING GENETICS: POLYGENIC SCORES (118515)

JAVIER SCHNEIDER PENATE

TERM:	Winter 2022/23
MEETING TIME:	preparatory Meeting: Monday, 7.11.2022, 10 – 12 (IA 02/452) 14.01. – 15.01.2023, 9 - 18
ROOM:	IA 1/161
CP:	3

Language of instruction: English

Enrollment: please write an e-mail to the lecturer Javier Schneider Penate including your matriculation number:

javier.schneiderpenate@ruhr-uni-bochum.de

Aim of the seminar is to give the participants an insight into the analysis of genome wide data in humans.

The block seminar consists of two parts:

- 1) Presentations about a selection of studies investigating "GWAS" and "Polygenic Scores".
- 2) Training in preprocessing and analysis of a genotyped data set using specialized software of bioinformatics ("PLINK", PRSice 2") to be able to calculate Polygenic Scores. Afterwards, the link between Polygenic Scores and MRI-based functional respectively structural connectivity measures of the brain will be investigated using the software "R".

SEMINAR

INTRODUCTION TO SINGLE-CELL RECORDINGS (112617)

DR. ROLAND PUSCH, CELIL SEMIH SEVINCIK, M.SC.

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 10 - 12
ROOM:	IB 6/127
CP:	3

In this seminar we will give an overview of the neurophysiological processes underlying spike trains. We will start with the biological basics of spike generation and the electrical activity accompanying neural communication. After setting up the theoretical framework, we will have hands-on sessions both for data acquisition and spike sorting. To get credit points, students need to present a scientific article.

Literature: Literature will be announced at the beginning of the seminar

SEMINAR

**BILDGEBENDE VERFAHREN IN DER NEUROPSYCHOLOGIE
(118513)**

DR. ANTOINE BOUYEURE, DR. CARLOS A. GOMES

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 12 – 14 (First Meeting: 19.10.2022)
ROOM:	IB 02/109. PC-Pool or online
CP:	3

Language of instruction: German

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.

SEMINAR

DISCOURSE NEUROPSYCHOLOGY (118611)

[DISKURS NEUROPSYCHOLOGIE]

ENSIYEH GHASEMIAN SHIRVAN, M.SC.

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 10 – 12 (First Meeting: 20.10.2022)
ROOM:	IA 1/169
CP:	3

Brain stimulation techniques, physiological investigations to clinical application

The application of non-invasive brain stimulation (NIBS) techniques has broadened our understanding of brain-behavior relationships. These methods have the capacity to modulate neural processes in the brain non-invasively and safely. Therefore, enable researchers to directly study how experimentally altered neural activity causally affects behavior. As a result, NIBS methods led to ground-breaking findings on the brain basis of various aspects of behavior and have raised interest in possible clinical and practical applications of these methods.

In this journal club, we will review and discuss literature on NIBS techniques, from basic research to practical applications.

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 case you want to learn the fMRI –technique in the first semester, an individual application for the course is necessary at Dr. Erhan Genç (erhan.genç@rub.de).

AM7

fMRI Training

BLOCK SEMINAR & PRACTICAL COURSE

NEUROPSYCHOLOGICAL METHODS: fMRI (118518 & 118519)

DR. ERHAN GENÇ

TERM:	Winter 2022/23
MEETING TIME:	Preparatory Meeting: 10.10.2022, 18.00 via Zoom; block: 13.11. – 14.11.22 & 20.11. – 21.11.22, 10 - 18
ROOM:	IB 02/109 (PC-Pool)
CP:	6

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. Participants must participate in both courses to get credit points: The aim of this course is to learn how magnetic resonance imaging can be used to acquire new scientific knowledge. Its main aim is to give the participants an insight into the evaluation and analysis of structural and functional MRI data and present their results in a scientific manner. The structural data are composed of high-resolution anatomical and diffusion-weighted measurements (DTI) which can be used to visualize the white matter fibre bundles. The functional data include common fMRI and resting state measurements to determine spontaneous brain activity. To pass this course, participants must be present on at least 2/3 of the seminar. This course is designed specifically for students of the cognitive science master program and due to the practical exercises, the number of participants is limited to 12.

After the subscription in eCampus where everyone is placed on the waiting list participants will be selected during the first meeting.

Please register via online registration if interested.

Sessions:

Mo (10.10.2022), 18:00, via Zoom

So (13.11.2022), 10:00 to 18:00, IB 02/109. PC-Pool

Mo (14.11.2022), 10:00 to 18:00, IB 02/109. PC-Pool

So (20.11.2022), 10:00 to 18:00, IB 02/109. PC-Pool

Mo (21.11.2022), 10:00 to 18:00, IB 02/109. PC-Pool

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 the program coordinator or Prof. Dr. Jonas Rose. Students are only allowed to take up to 15 credit points in courses with German as language of instruction in the whole program.

D1

Free Selection

LECTURE

STRESS (117031)

PROF. DR. OLIVER T. WOLF

TERM:	Winter 2022/23
MEETING TIME:	Monday, 12 – 14 (First Meeting: 17.10.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

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 (112231)**

PROF. DR. PHIL. DR. H.C. ONUR GÜNTÜRKÜN

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 16 – 18 (First Meeting: 20.10.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

Die Vorlesung soll einen Überblick über die Lerngesetze, ihre Anwendungsmöglichkeiten in therapeutischen Verfahren und die hirnpfysiologischen 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.

Literatur: Als Vorbereitung ist folgendes Buch zu empfehlen:

The Principles of Learning and Behaviour, Michael Domjan, 7. Auflage, 2015

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

PROF. DR. NIKOLAI AXMACHER

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 08.00 – 10.00 (First meeting: 19.10.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

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.

LECTURE

MOTIVATION UND VOLITION (112271)

DR. RER. NAT. MARLIES PINNOW

TERM:	Winter 2022/23
MEETING TIME:	Monday, 16 – 18 (First meeting: 17.10.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

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.

The course will be held in German. Students may choose to take the exam in English. The recommended literature for those following this option is:

Heckhausen J. & Heckhausen, H. (2010). Motivation and Action. Cambridge: Cambridge University Press.
Schmalt, H.-D. & Langens, T. A. (2009): Motivation (4. vollständig überarbeitete Auflage). Stuttgart: Kohlhammer
Heckhausen, J. & Heckhausen, H. (2010): Motivation und Handeln (4. Auflage). Berlin: Springer.

D1

Free Selection

SEMINAR

STRESS UND KOGNITION (118032)

PD DR. RER. NAT. CHRISTIAN MERZ

TERM:	Winter 2022/23
MEETING TIME:	Wednesday 12 – 14 (First Meeting: 19.10.2022)
ROOM:	IA 02/460
CP:	3

Language of instruction: German

Stress beeinflusst nicht nur unser Befinden, sondern auch die unterschiedlichsten kognitiven Prozesse. In dieser Veranstaltung werden eine Auswahl an kognitiven Prozessen besprochen, die sich unter dem Einfluss von Stress und Stresshormonen verändern, beispielsweise das deklarative Gedächtnis oder die Furchtkonditionierung. Hierbei werden humanexperimentelle Befunde in Form von Referaten dargestellt und diskutiert.

Literatur: Die Literatur für die Referate wird in der ersten Sitzung bekannt gegeben.**D1**

Free Selection

SEMINAR

NEUROTOXIKOLOGIE: VOM NEURON ZUM VERHALTEN (118411)

PD DR. CHRISTOPH VAN THRIEL

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 16 – 18 (First Meeting: 18.10.2022)
ROOM:	IB 02/135
CP:	3

Language of instruction: German

Eine Vielzahl von Chemikalien am Arbeitsplatz und in der Umwelt interagieren mit neuronalen Strukturen, können diese bei entsprechender Dosis nachhaltig schädigen und so kognitive Leistungen mindern. Im Seminar sollen biochemische Mechanismen neurotoxischer Schädigungen, neuropsychologische Methoden zur Erfassung subklinischer Schädigungen, neurotoxisch-verursachte Erkrankungen und neurokognitive Effekte akuter Gefahrstoffexpositionen diskutiert werden.

van Thriel, C.: Verhaltenstoxikolog[i]e / C. van Thriel In: : -Das- Toxikologiebuch, 311-327 - 2017

*SEMINAR***NEUROPSYCHOLOGISCHE REHABILITATION I (118121)**

PD DR. BORIS SUCHAN

TERM:	Winter 2022/23
MEETING TIME:	Mo, 24.10.22, 10 – 12 Fr, 13.01.23 & 20.01.23, 9 - 17
ROOM:	IA 1/91
CP:	3

Language of instruction: German

In diesem Seminar sollen Möglichkeiten und Grenzen kognitiver neuropsychologischer Rehabilitation am Beispiel verschiedener neuropsychologischer Störungsbilder wie z.B. Schlaganfall, Demenz oder Multiple Sklerose aufgezeigt werden. Es werden aktuelle Konzepte und Inhalte neuropsychologischer Therapien bei Gedächtnis- Aufmerksamkeitsdefiziten etc. dargestellt. Ebenso werden psychotherapeutische Möglichkeiten zur Bewältigung psychologischer Folgen bei neurologischen Erkrankungen aufgezeigt und diskutiert.

Literatur: Eine Literatur ist zu Beginn des Seminars erhältlich

SEMINAR

PHILOSOPHIE DER PSYCHIATRIE (030059)

DR. WANJA WIESE

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 16 – 18 (First Meeting: 11.10.2022)
ROOM:	GA 03/46
CP:	3 or 6

Language of instruction: German

Was sind psychische Erkrankungen bzw. mentale Störungen? Wie können mentale Störungen unser Verständnis von mentalen Zuständen vertiefen? Wie lassen sich mentale Störungen erklären und klassifizieren?

Von diesen drei Fragen werden wir uns in diesem Seminar leiten lassen und dadurch einerseits begriffliche und wissenschaftstheoretische Probleme diskutieren, die für die Psychiatrie spezifisch sind, sowie andererseits Bezüge zu Fragen aus der Philosophie des Geistes herstellen.

Wir werden hauptsächlich englischsprachige Texte lesen.

Literature:

- Cooper, R. (2008). *Psychiatry and Philosophy of Science*. Routledge.
Thornton, T. (2022). *Mental Illness*. Cambridge University Press.
Tsou, J. Y. (2021). *Philosophy of Psychiatry*. Cambridge University Press.

SEMINAR

EINFÜHRUNG IN DIE PHILOSOPHIE DER EMOTIONEN (030050)

PHILIPP KEIM, M.A.

TERM:	Winter 2022/23
MEETING TIME:	Monday, 14 – 16 (First Meeting: 10.10.2022)
ROOM:	GA 04/187
CP:	3 or 6

Language of instruction: German

Emotionen sind in der Philosophie traditionell ein wenig beachtetes, bzw. vernachlässigtes Thema. Häufig werden sie als der Vernunft untergeordnet betrachtet und gelten als etwas, das es zu überwinden gilt. Emotionen stehen in diesem Kontext in Konkurrenz zur Vernunft oder zu vernünftigem Handeln. Diese Sichtweise auf Emotionen soll in diesem Seminar in Frage gestellt werden. Gerade mit Blick auf epistemische Emotionen, wie z.B. Verwirrung oder Neugier, lässt sich bezweifeln, dass Vernunft streng von Emotionen getrennt werden kann und sich beide viel mehr wechselseitig bedingen. Neben konkreten Fragen nach spezifischen Emotionen soll auch allgemein die Frage gestellt werden, was Emotionen überhaupt sind, sowie die Fragen danach, wie und warum Emotionen entstehen. Hierfür betrachten wir zeitgenössische, sowie klassische Texte zum Thema.

Literatur: Die Literatur, die im Seminar behandelt wird, wird in einem Moodle-Kurs bereitgestellt und wird teilweise in Deutscher, bzw. in Englischer Sprache verfügbar sein.

SEMINAR

THEORIEN DER RATIONALITÄT (030016)

DR. NINA POTH

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 10 – 12 (First Meeting: 19.10.2022)
ROOM:	GABF 05/703
CP:	4

Language of instruction: German

Wir bewerten andere und uns selbst oft als rational oder irrational beziehungsweise vernünftig. Aber was bedeuten solche Zuschreibungen eigentlich? Und auf welcher Grundlage kann oder sollten Entscheidungen und Verhalten überhaupt als (ir)rational bewertet werden? Sollten die Kriterien gleich sein für Mensch und Tier; Mensch und Maschine? In diesem Seminar diskutieren wir dieses Thema aus verschiedenen Perspektiven der theoretischen Philosophie und Psychologie. Unter anderem diskutieren wir Beispiele der Verhaltensinterpretation, Bewertungen von Denkfehlern und sogenannte "Framing Effects". Wir schauen uns Ansätze aus der Logik, Wahrscheinlichkeits- und Entscheidungstheorie an und wenden gelerntes an, um die Relationen zwischen Rationalität und Normkonformität, Intelligenz, Selbsttäuschung und Irrationalität zu untersuchen. Ziel des Seminars ist es, Teilnehmenden einen Überblick über zeitgenössische Rationalitätsansätze zu geben und Ihnen die Fähigkeit zu vermitteln, diese systematisch zu analysieren und in eigenständige Argumentationen einzubetten.

Literatur:

Knauff, M. & Spohn, W. (2021). *Psychological and Philosophical Frameworks of Rationality—A Systematic Introduction*. In Knauff, M. & Spohn, W. (Hrsg.): *The Handbook of Rationality*, 1-50.

SEMINAR

WAHRSCHEINLICHKEIT UND INDUKTION (030042)

JUN.PROF. DR. PETER BRÖSSEL

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 10 – 12 (First meeting: 13.10.2022)
ROOM:	GABF 04/358
CP:	6

Language of instruction: German

Seit Hume nimmt das Problem der Induktion eine zentrale Rolle in Erkenntnis- und Wissenschaftstheorie ein. Der populärste Ansatz, das Problem der Induktion zu lösen, beruht auf der Wahrscheinlichkeitstheorie. Diese Lehrveranstaltung bietet sowohl eine Einführung in die Wahrscheinlichkeitstheorie (für Philosophen) als auch eine Einführung in die Philosophie der Wahrscheinlichkeiten und der Induktion.

Literatur: Jonathan Weisberg . Varieties of Bayesianism. In: *Handbook of the History of Logic, vol. 10* (Eds.) Dov Gabbay, Stephan Hartmann, and John Woods (herunterladbar über Weisbergs Homepage)

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

EXTRA RESEARCH COLLOQUIUM "METAPHILOSOPHY AND EXPERIMENTAL PHILOSOPHY" (030128)

JUN-PROF. DR. JOACHIM HORVATH

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 16 – 18 (First Meeting: 12.10.2022)
ROOM:	GAFO 04/271
CP:	3 or 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, many of which are leading experts in their field. Students at the master or doctoral level will be given the opportunity to present their work in English.



I1. Cognitive Philosophy

COLLOQUIUM

RESEARCH COLLOQUIUM: RATIONALITY AND COGNITION (030132)

JUN.PROF. DR PETER BRÖSSEL

TERM:	Winter 2022/23
MEETING TIME:	Monday, 16 – 18 (First Meeting: 10.10.2022)
ROOM:	GABF 04/358
CP:	3 or 6

In this seminar we study research articles (some of which will be work in progress) from the intersection of normative epistemology and descriptive epistemology (i.e., psychology and cognitive science). Among others, we investigate formal models of perception, rational reasoning and rational action. Acquaintance with formal methods in philosophy such as logic, set theory and probability theory will be presupposed. Students at the master or doctoral level will be given the opportunity to present their research in English.



I1. Cognitive Philosophy

COLLOQUIUM

RESEARCH COLLOQUIUM: NEW FORMS OF SOCIAL INTERAC- TION WITH ARTIFICIAL INTELLIGENT SYSTEMS (030133)

PROF. DR. TOBIAS SCHLICHT

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 12 – 14
ROOM:	online
CP:	3 or 6

The colloquium resembles a journal club for advanced MA students and PhD students as well as postdocs. We will discuss papers relevant for the topic „New forms of social interaction with artificial intelligent systems“, i.e., we will focus on interaction via social media and on human-robot- interaction, i.e. social robots.

The course credit is 6CP if students write a larger essay or do an oral exam, otherwise they can receive 3CP for either ungraded or graded credit based on smaller assignments. Please write an e-mail to tobias.schlicht@rub.de to register for the colloquium and to receive the Zoom-links for the colloquium.

*COLLOQUIUM***PHILOSOPHY MEETS COGNITIVE SCIENCE:
MEMORY AND LANGUAGE (030131)**

PROF. DR. MARKUS WERNING

IN COOPERATION WITH: PROF. DR. KRISTINA LIEFKE (BOCHUM),

PROF. DR. KOURKEN MICHAELIAN (GRENOBLE), AND

PROF. DR. DANIEL GUTZMANN (BOCHUM)

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 16 – 19 (First Meeting: 13.10.2022)
ROOM:	Hybrid (GA 04/187)
CP:	3 or 6

In the research colloquium current topics at the interface between Philosophy and Cognitive Science will be discussed. The colloquium hosts talks by leading international 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.

This semester the sessions of the research colloquium will alternate in a bi-weekly rhythm between the topics "Memory" and "Language". The memory talks will be organized in cooperation with Prof. Kourken Michaelian. The language talks will be hosted together with Prof. Dr. Kristina Liefke and Prof. Dr. Daniel Gutzmann. A detailed schedule will be published in due course at <https://www.ruhr-uni-bochum.de/phil-lang/colloquium.html>. The colloquium sessions will be held in a hybrid format in person/Zoom.

*COLLOQUIUM***INTERDISCIPLINARY READING CLUB: RECENT DEBATES ON SITUATED COGNITION (030127)**

PROF. DR. ALBERT NEWEN

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 14 – 16 (First Meeting: 11.10.2022)
ROOM:	GA 04/187
CP:	3 or 6

The Interdisciplinary Reading Club offers a systematic engagement with the work of researchers central to the field of situated cognition, including aspects of social cognition, situated affectivity, child development, and comparisons between humans and animals. The Interdisciplinary Reading Club consists of two components. First, there will be presentations by external guests working in the field of situated cognition. Second, participants have the opportunity to present their own work and receive feedback from the group. The Reading Club has an interdisciplinary dimension such that perspectives from philosophy, psychology, neurosciences, biology, and cognitive science are interconnected with a focus on the situatedness of cognitive processes. The aim of the Interdisciplinary Reading Club is to offer a platform for discussion of ongoing research and to support the education of students, especially at a Master and PhD level. Presentations and discussions will be in English. Master and PhD students as well as postdocs who are interested should write an email to Prof. Albert Newen (albert.newen@rub.de) & Julia Wolf (julia.wolf-n8i@ruhr-uni-bochum.de) and come to the first meeting.

*COLLOQUIUM***COLLOQUIUM: PHILOSOPHY OF LANGUAGE, LOGIC, AND INFORMATION (030120)**

JUN.PROF. DR. KRISTINA LIEFKE, PROF. DR. DOLF RAMI

TERM:	Winter 2022/23
MEETING TIME:	Wednesday, 17.30 – 19.00 (First Meeting: 12.10.2022)
ROOM:	GA 04/187
CP:	3 or 6

This colloquium serves the discussion of current topics at the semantic interface of logic, the philosophy of language, and the philosophy of information. The colloquium will combine talks by international experts with presentations of local researchers and (PhD/MA) students. Students will be given the opportunity to present their (ongoing) work in English.

A detailed schedule will be available at:

<https://www.ruhr-uni-bochum.de/phil-inf/colloquium/index.html.en>.

*COLLOQUIUM***SCIENTIFIC COLLOQUIUM: COGNITIVE PSYCHOLOGY AND
PSYCHONEUROENDOCRINOLOGY (118113)****[FORSCHUNGSKOLLOQUIUM KOGNITIONSPSYCHOLOGIE UND
PSYCHONEUROENDOKRINOLOGIE]**

PROF. DR. OLIVER T. WOLF

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 16 – 18 (First Meeting: 18.10.2022)
ROOM:	IA 02/460
CP:	3

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 worldwide 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 lab homepage at the beginning of the semester.

<https://www.cog.psy.ruhr-uni-bochum.de/cog/teaching/colloquium/index.html.en>

The seminar will be held in the English language.

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

*SEMINAR***JOURNAL CLUB: TOPIC NEUROPSYCHOANALYSIS (118915)****[JOURNAL CLUB: THEMA NEUROPSYCHOANALYSE]**

PROF. NIKOLAI AXMACHER

TERM:	Winter 2022/23
MEETING TIME:	Thursday, 16 – 18 (First Meeting: 13.10.2022)
ROOM:	IB 6/127
CP:	3

Language of instruction: English

Analogous to cognitive neurosciences – the investigation of neural correlates of cognitive processes – in the past years also concepts of psychoanalysis were studied using imaging methods. In this seminar, current research of the neuropsychology department as well as talks of guest about clinical neuropsychological topics are presented. Here, current research about central psychoanalytic concepts (suppression, conversion, dreams, traumas...) but also studies about the mechanisms of psychodynamic psychotherapy and psychodynamic conceptualization of neuropsychological symptoms will be presented and discussed.

A 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.

*COLLOQUIUM***RESEARCH COLLOQUIUM GENETIC PSYCHOLOGY (118913)****[FORSCHUNGSKOLLOQUIUM GENETIC PSYCHOLOGY]**

DR. VANESSA LUX

TERM:	Winter 2022/23
MEETING TIME:	Monday, 16 – 18 (First Meeting: 17.10.2022)
ROOM:	IA 02/460
CP:	3

This forum serves to present current research projects and qualification theses (bachelor theses, master theses, PhD projects) of the Genetic Psychology Unit. In addition, invited scientists will present current research results on genetics, epigenetics and developmental psychobiology.

A schedule will be available on the Genetic Psychology Homepage from the beginning of the semester.

Cognitive Science students can receive 3 CP for attendance plus submitting an essay.

*COLLOQUIUM***RESEARCH COLLOQUIUM: INTERDISCIPLINARY PERSPECTIVES
ON EPISODIC MEMORY (212102)**

PROF. DR. SEN CHENG

TERM:	Summer 2022
MEETING TIME:	Friday, 14.00 – 15.30 (First Meeting: 14.10.2022)
ROOM:	GA 04/187
CP:	3

This research colloquium covers the range of topics in the interdisciplinary research unit FOR 2812 "Constructing scenarios of the past: A new framework in episodic memory". Presentations will focus on the cognitive and neuronal mechanisms underlying scenario construction in episodic memory. The discussed studies employ and integrate approaches from philosophy, psychology, as well as experimental and computational neuroscience. The colloquium hosts talks by leading international experts and local researchers as well as presentations by doctoral and master students.

Assessment: term paper

Course material: available on Moodle (registration required)

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

Office hours: Thursdays 14:00-15:00

Capacity: max. 15 students

Enrollment: eCampus

Requirements: advanced knowledge of learning and memory

PROJECT SEMINAR

MACHINE LEARNING: UNSUPERVISED METHODS
(212501)

PROF. DR. LAURENZ WISKOTT

TERM:	Winter 2022/23
MEETING TIME:	Tuesday, 10:30 – 13:45 (First Meeting: 11.10.2022)
ROOM:	Online
CP:	9

This course can be used either in module AM4 or in module I3.

This course is given with the *problem based learning* concept. The students work in groups of about 5 on realistic problems that can be solved with unsupervised learning methods from machine learning. They develop hypotheses and strategies for a solution and identify what they need to learn in order to implement these. Thus, the students will not only learn about machine learning but also soft skills.

This course covers a variety of unsupervised methods from machine learning such as principal component analysis, independent component analysis, vector quantization, clustering, Bayesian theory and graphical models.

After the successful completion of this course the students

- know a number of important unsupervised learning methods,
- can discuss and decide which of the methods are appropriate for a given data set,
- understand the mathematics of these methods,
- know how to implement and apply these methods in python,
- have gained experience in organizing and working in a team,
- know problem solving strategies like brain storming,
- can communicate about all this in English.

Exam: As an exam prerequisite (Prüfungsvorleistung) participants have to structure and document their learning progress and contribution to the group work, including setting personal testable milestones. The course is concluded with a ca 20 min graded oral exam. The dates are set at the end of the semester.

Condition for granting the credit points (Voraussetzungen für die Vergabe von Kreditpunkten): Exam prerequisite and passed oral exam

Moodle: <https://moodle.ruhr-uni-bochum.de/m/course/view.php?id=47270>

Requirements: The mathematical level of the course is mixed but generally high, including calculus (functions, derivatives, integrals, differential equations, ...), linear algebra (vectors, matrices, inner product, orthogonal vectors, basis systems, ...), and a bit of probability theory (probabilities, probability densities, Bayes' theorem, ...). Programming is done in Python, thus the students should have a basic knowledge of that as well, or at least be fluent in another programming language.

Literature: For most topics a script will be available

*SEMINAR***JOURNAL CLUB: LEARNING AND MEMORY (212103)**

PROF. DR. SEN CHENG

TERM:	Winter 2022/23
MEETING TIME	Tuesday, 14 – 16 (First Meeting: 11.10.2022)
ROOM:	Online
CP:	3

We will focus on the neural basis of learning and memory at the systems level. In each (online) 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

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

Capacity: max. 15 students

Enrollment: VSPL

*ONE-WEEK PRACTICAL COURSE***AUTONOMOUS ROBOTICS (212401)**

PROF. DR. RER. NAT. GREGOR SCHÖNER

TERM:	Winter 2022/23
MEETING TIME	Block: 27.02.23 – 03.03.23, Mo – Fr: 09 - 17
ROOM:	NB 02/77
CP:	3

This course can be used either in module C2 or in module I3.

The practical course gives an introduction to mobile robotics with a focus on dynamical systems approaches. The open-source simulation environment Webots 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.

The practical part of the lab course consists of a week of full-time work in which students solve programming tasks with simulated mobile robots. The students then write reports in which they describe and analyze the work they have done. The grade for the lab course is based on both the practical work and the report. Students will get support during programming.

Requirements: 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).

Enrollment: Limited number of participants! Please enroll:

- at www.ini.rub.de (enrollment period: October 4 to November 14, 2022) and
- with your examination office or by FlexNow (enrollment period: December 1, 2022 to January 13, 2023)

*COLLOQUIUM***THEMEN DER KOGNITIVEN NEUROWISSENSCHAFT (118711)**

PROF. DR. PHIL. DR. H.C. ONUR GÜNTÜRKÜN,
 PROF. DR. OLIVER T. WOLF, PROF. DR. NIKOLAI AXMACHER

TERM:	Winter 2022/23
LECTURE:	Friday, 10 – 12 (First meeting: 14.10.2022)
ROOM:	IB 6/127
CP:	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.

*COLLOQUIUM***RESEARCH COLLOQUIUM NEUROPSYCHOLOGY (118916)**

[FORSCHUNGSKOLLOQUIUM NEUROPSYCHOLOGIE]

PROF. DR. NIKOLAI AXMACHER

TERM:	Winter 2022/23
MEETING TIME:	Thursday 14 – 16 (First meeting: 21.10.2021)
ROOM:	IB 6/127
CP:	3

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.

14

14. Cognitive Neuroscience

*COLLOQUIUM***BIOPSYCHOLOGY RESEARCH COLLOQUIUM (118914)**

PROF. DR. PHIL. DR. H.C. ONUR GÜNTÜRKÜN

TERM:	Winter 2022/23
MEETING TIME:	Monday, 13 – 15 (First meeting: 17.10.2022)
ROOM:	IB 6/127
CP:	3

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-uni-bochum.de/>.

14

14. Cognitive Neuroscience

*COLLOQUIUM***COLLOQUIUM: NEURAL BASIS OF LEARNING (118919)****[KOLLOQUIUM: NEUROBIOLOGIE DES LERNENS]**

PROF. DR. JONAS ROSE

TERM:	Winter 2022/23
MEETING TIME:	Friday, 12 – 14 (First meeting: 21.10.2022)
ROOM:	GA 04/187
CP:	3

A broad range of current research topics in cognitive neuroscience will be covered by internal and external speakers. Our focus lies in a mechanistic understanding of crucial processes that in turn form the basis of higher cognition.

If you want to participate in this course and receive credit points, please send an e-mail to jonas.rose@rub.de.

A schedule will be available on the homepage <https://www.ngl.psy.ruhr-uni-bochum.de/ngl/>