

Course Guide

Master Cognitive Science

Summer 2022

Version as of 01.04.2022

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Enrollment for Courses

Students are requested to register with the university's eCampus-system and should be aware of the deadlines. Exceptions include the courses in neuroinformatics, e.g. held by Prof. Wiskott and Prof. Schöner. Here, there will be **no eCampus registration**, but a manual enrollment in the first session.

Please notice that one and the same course can only be used to be part of one module for each student. Double use of the same course is not allowed.

IMPORTANT: The summer term starts on 01.04.2022. Please consult eCampus for up-to-date information regarding the course format, starting dates and further detail.

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.

FIRST YEAR PROGRAM

C. Topics Selection

C1

C1. Social Cognition & Meta-Science

BLOCK SEMINAR

SOCIAL PSYCHOLOGY OF PREJUDICE (112316)

DR. LUSINE GRIGORYAN

TERM:	Summer 2022
MEETING TIME:	Introductory meeting: 13.04.2022, 14 – 16 Block: 17.06.2022, 10 – 18 18.06.2022, 10-18
ROOM:	IA 02/445
CP:	3

This seminar aims to provide an overview of psychological approaches to prejudice. We will discuss cognitive underpinnings of prejudice and why some individuals are more prejudiced than others. We will explore theories of intergroup relations to understand why racism, sexism, and other forms of prejudice and discrimination are so persistent.

C1

C1. Social Cognition & Meta-Science

*BLOCK SEMINAR***CROSS CULTURAL PSYCHOLOGY (112313)**

DR. LUSINE GRIGORYAN

TERM:	Summer 2022
MEETING TIME:	Wednesday, 12 – 14 (First Meeting: 06.04.2022)
ROOM:	IA 1/161
CP:	3

Culture is elusive, very difficult to define and even more difficult to measure. And yet, it affects every aspect of our lives, often without us noticing: "Culture is to humans as water is to fish". In this seminar, we will discuss how culture can be defined and measured, how it is acquired in childhood, and how it affects various aspects of psychological functioning. We will also explore applications of cross-cultural psychology, focusing on acculturation, intercultural communication, and diversity management.

C1

C1. Social Cognition & Meta-Science

*SEMINAR***MORAL PSYCHOLOGY (112319)**

DR. VLADIMIR PONIZOVSKIY

TERM:	Summer 2022
MEETING TIME:	Wednesday, 12 – 14
ROOM:	IA 1/87
CP:	3

The ideas of "right" and "wrong", "good" and "bad" are central to our decision-making. How does ethical decision-making develop? How do reasoning and affect contribute to making ethical decisions? What beliefs and principles underlie ethical choices?

In this seminar, the students will engage with key theoretical and empirical articles in the field of moral psychology. Passing the course will require regular reading and critical engagement with the texts through presentations and class discussions.

SEMINAR

THEORY OF SELF CONSCIOUSNESS (030084)

PROF. DR. ALBERT NEWEN

(IN COOPERATION WITH PROF. KATJA CRONE)

TERM:	Summer 2022
MEETING TIME:	Monday, 16 – 18 (First Meeting: 04.04.2022)
ROOM:	online
CP:	6

In this seminar, we will explore theories of self-consciousness. This includes a variety of phenomena which are part of or closely related to self-consciousness, namely the sense of agency, of ownership and the phenomenon of perspectivity as well as the role of an autobiographical self and its development. Especially concerning the latter we have to account for the role of memory for our autobiographical self. This seminar is a research-oriented seminar which especially enables the participants to develop a project which leads into a BA-thesis or a master-thesis. It has a focus in philosophy but will involve some psychological texts as well. The main topic is the discussion of modern theories of human self-consciousness. Self-consciousness can be defined as the ability to consciously represent one's own states, especially (but not only) mental states, as one's own (Newen, Vogeley 2003). Concerning self-consciousness, we can distinguish four central questions which allow us to illustrate the wide range of this central debate:

The epistemological question: Do we have a privileged access to our own mental phenomena such that only we can know with certainty which mental phenomena we have?

The ontological question: Is there a self as an ontologically irreducible entity?

The cognitive question: How can we investigate the natural basis of self-c. with the methods of empirical psychology and cognitive neuroscience?

The question about personal identity: What is the criterion of being a person and of remaining the same person?

In the seminar we will discuss texts concerning all dimensions of human self-consciousness. Furthermore, we will discuss the role of episodic memory for a self-model: how can we adequately describe the interaction of a narrative self, i.e. the autobiographical stories a person tells about herself, with her episodic memories? On the one hand, episodic memories are constructed in line with and thus constrained by a narrative self, on the other hand, the narrative self is at least partially constituted by the episodic memories a person has. How can we account for this interdependence and account for the narrative self and its development?

Details for receiving a certificate will be presented at the beginning of the seminar.

The workload involves the standard tools of oral presentations and essay writing.

Presentations and discussions will be in English.

If this seminar is used for module AM1, it cannot be used for module C1.

SEMINAR

**GUALTIERO PICCININI: NEUROCOGNITIVE MECHANISMS
(030098)**

DR. WANJA WIESE

TERM:	Summer 2022
MEETING TIME:	Tuesday, 16 – 18 (First Meeting: 05.04.2022)
ROOM:	GA 3/143
CP:	3-6

According to the computational theory of cognition (CTC), cognitive processes are computations. The classical CTC holds that no details about how the brain implements computations are required to explain biological cognition. In his book *Neurocognitive Mechanisms*, Gualtiero Piccinini argues that complete computational explanations must also identify the neural mechanisms underpinning cognitive phenomena. Such mechanisms span multiple levels and perform the causal roles constituting cognitive capacities. The resulting version of CTC defended by Piccinini comprises an account of neural computation. It is a version of functionalism, according to which the mind is the functional organization of the brain.

In this seminar, we will read and discuss Piccinini's book chapter by chapter. In doing so, we will familiarize ourselves with his and alternative accounts of mechanistic models of cognition, physical computation, information processing, computational explanation, multiple realizability, medium independence, computational and non-computational functionalism, and neural representation.

You can receive 3 CP without grading or 6 CP with a graded oral exam or essay.

Literature:

Piccinini, G. (2020). *Neurocognitive Mechanisms: Explaining biological cognition*. MIT Press.

LECTURE

GENERAL PHILOSOPHY OF SCIENCE (030003)

JUN.PROF. DR. JAN BAEDKE

TERM:	Summer 2022
MEETING TIME:	Thursday, 14 – 16 (First meeting: 07.04.2022)
ROOM:	HGA 30
CP:	4 – 6

Philosophy of science reflects on the foundations, methods and aims of science. General philosophy of science includes further subjects like patterns of the historical development and the social structure of science. In the closer sense, it can be retraced continuously from the ancient world until present. Several disciplinary terms (such as “philosophy of mathematics” or later “philosophy of physics” and “philosophy of biology”) have been developed not until the 18th century and reflect the increasing significance of specific scientific knowledge for modern philosophy. The lecture gives an overview over the present status of general philosophy of science. It deals, on the one hand, with problems of methods and certain key concepts (such as “explanation” and “understanding”); on the other hand, it examines questions that focus on the significance of the historicity of scientific knowledge for the present sciences.

The lecture is initially addressed to students of philosophy in general and of the master program HPS+ in particular. It is open for interested students of other subjects with (at least) basic knowledge in theoretical philosophy.

The language of the lecture will be English. You will be informed about modalities concerning credits in the first session of the lecture.

Introductory Literature:

Martin Curd, M. & James A. Cover (Eds.), *Philosophy of Science. The Central Issues*. 2nd ed., New York, London 2013.

Simon Lohse & Thomas Reydon (Hgg.): *Grundriss Wissenschaftsphilosophie. Die Philosophien der Einzelwissenschaften*. Hamburg 2017.

Alexander Rosenberg, *Philosophy of Science. A Contemporary Introduction*. 2nd ed., New York 2005.

Note:

If you would like to additionally participate in the supplementary seminar (**Special topics in philosophy of science, 030094**), the seminar can be used in the D-module. To participate in the seminar, the lecture must be attended as well.

C2

C2. Perception & Action

*LECTURE***PERCEPTION (118311) [WAHRNEHMUNG]**

PROF. DR. JONAS ROSE

TERM:	Summer 2022
MEETING TIME:	Wednesday, 12 – 14 (First Meeting: 06.04.2022)
ROOM:	IA 02/445
CP:	3

In this lecture, we will cover the neural basis of different sensory modalities. Starting with the physical stimulus and its detection at the receptor we will then continue along the sensory hierarchy in the brain. Finally, the modulation of the stimulus through attention, categorization and multimodal integration will be covered. In addition to our focus on human sensory systems, we will compare the sensory systems and capabilities of different species.

The lecture will be held in English.

C2

C2. Perception & Action

*SEMINAR***PERCEPTION (118312) [WAHRNEHMUNG]**

PROF. DR. JONAS ROSE

TERM:	Summer 2022
MEETING TIME:	Friday, 10 – 12 (First Meeting: 08.04.2022)
ROOM:	GA 04/187
CP:	3

This seminar complements the lecture 'perception' by adding a more hands-on approach. You will give short lectures and conduct mini-experiments to highlight specific topics and deepen the understanding of selected mechanisms.

C2

C2. Perception & Action

*LECTURE***EPISTEMOLOGY (030007)**

PROF. DR. PETER BRÖSSEL

TERM:	Summer 2022
MEETING TIME:	Monday, 10 – 12 (First Meeting: 04.04.2022)
ROOM:	GABF 05/703
CP:	6

This lecture is dedicated to classic topics of epistemology. What should I believe? What are justificatory reasons? What is knowledge? Can I trust the testimonies of others? How should I revise my credences in the face of disagreement with a peer or an expert? The lecture is dedicated exclusively to contemporary proposals to answer these questions and is, therefore, aimed at advanced students. The course also requires a certain familiarity with these epistemological questions from a historical and systematic perspective.

C2

C2. Perception & Action

*SEMINAR***JOURNAL CLUB: NEUROBIOLOGY (190573)****[WISSENSCHAFTLICHE PRÄSENTATIONEN IN ENGLISCH]**

PROF. DR. MELANIE MARK

TERM:	Summer 2022
MEETING TIME:	Wednesday, 9 - 11 (First Meeting: tba)
ROOM:	ND6/56a / online
CP:	3

This course is a weekly journal club with focus on neuroscience. Please contact sekretariat@neurobiologie.ruhr-uni-bochum.de or Melanie.Mark@rub.de for further information.

Requirements: basic understanding of neurosciences

SEMINAR

IS CONSCIOUSNESS AN ILLUSION? (030099)

DR. FRANÇOIS KAMMERER

TERM:	Summer 2022
MEETING TIME:	Wednesday, 16 – 18 (First Meeting: 06.04.2022)
ROOM:	GABF 04/358
CP:	6

Some researchers, philosophers, and scientists have claimed that consciousness might be nothing but an illusion. They think that consciousness does not really exist, although it might seem to us that it exists.

Consciousness – meaning here phenomenal consciousness – corresponds to mental states such that there is "something it's like to be in them": mental states which feel like something for the subject. Phenomenal consciousness is often thought to be a significant but mysterious feature of our mental lives. It plays a crucial role in our ethical conceptions: we often think that only creatures who are phenomenally conscious ("sentient") possess a certain kind of moral status. This is why it seems so important to know which animals are conscious, whether computers and robots can be conscious, etc.

This philosophy of mind seminar will explore the following questions: How can we make sense of the claim that consciousness is an illusion? Is this claim coherent, or does it contradict itself? How should it be interpreted? Could cognitive science really show that consciousness is an illusion, and how? Do we currently have good reasons to think that consciousness is indeed an illusion? If consciousness is an illusion, what are the consequences in ethics, or epistemology? Does that mean that nothing matters? Does that mean that we cannot know anything?

Literature:

- Chalmers, D. (1995). Facing up to the problem of consciousness. *Journal of Consciousness Studies*, 2(3), 200-219.
- Chalmers, D. (2018). The Meta-Problem of Consciousness. *Journal of Consciousness Studies*, 25(9-10), 6-61.
- Dennett, D. (1991). *Consciousness Explained*. Penguin.
- Frankish, K. (2016). Illusionism as a Theory of Consciousness. *Journal of Consciousness Studies*, 23(11-12), 11-39.
- Graziano, M. (2013). *Consciousness and the Social Brain*. Oxford University Press.
- Nagel, T. (1974). What is it like to be a bat? *Philosophical Review*, 83(October), 435-450.

*LECTURE & EXERCISE***AUTONOMOUS ROBOTICS: ACTION, PERCEPTION, AND COGNITION (211048 & 211248)**

PROF. DR. GREGOR SCHÖNER

TERM:	Summer 2022
LECTURE:	Thursday, 14.15 – 16.00 (First Meeting: 07.04.2022)
EXERCISE:	Thursday, 16.15 – 17.00 (First Meeting: 14.04.2022)
ROOM:	online
CP:	6

Autonomous robotics is an interdisciplinary research field in which embodied systems equipped with their own sensors and with actuators generate behavior that is not completely pre-programmed. Autonomous robotics thus entails perception, movement generation, as well as core elements of cognition such as making decisions, planning, and integrating multiple constraints.

This course touches on various approaches to this interdisciplinary problem. In the first half of the course, the main emphasis will be on dynamical systems methods for generating movement in vehicles. The main focus of the course is, however, on solutions to autonomous movement generation that are inspired by analogies with how nervous systems generate movement. The second half of the course will review core problems in human movement science, including the degree of freedom problem, coordination, motor control, and the reflex control of muscles.

If this seminar is used for Module I3, it cannot be used for C2.

Requirements

The emphasis of the course is on learning concepts, practicing interdisciplinary scholarship including reading and writing at a scientific and technical level. Mathematical concepts are used throughout, so understanding these concepts is important. Mathematical skills are not critical to mastering the material, but helpful. The mathematics is mostly from the qualitative theory of dynamical systems, attractors and their instabilities. Short tutorials on some of these concepts will be provided.

Exercises

The course is accompanied by exercises, which will be posted weekly. Participants will upload their solutions, which will be corrected and marked (for bonus points). The exercises and their solutions will be discussed by Rachid Ramadan in the weekly exercise live session.

You can register here: <https://www.ini.rub.de/elearning/?eid=350>

Find more information on the INI web page (https://www.ini.rub.de/teaching/courses/autonomous_robotics_action_perception_and_cognition_summer_term_2022/)

C3

C3. Memory, Learning & Decision Making

*SEMINAR***DISCOURSE NEURAL BASIS OF LEARNING (118165)**

PROF. DR. JONAS ROSE

TERM: Summer 2022
MEETING TIME: Monday, 9 - 11 (First Meeting: 04.04.2022)
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.

If you would like to participate in this course and receive credit points, please send an e-mail to lutz.wehrland@rub.de.

C3

C3. Memory, Learning & Decision Making

*BLOCK SEMINAR***TRACKING COGNITIVE REPRESENTATIONS WITH DEEP NEURAL NETWORKS (112625)**

DANIEL PACHECO

TERM: Summer 2022
MEETING TIME: Preliminary meeting: 16.04.2022, 11.00
 Block: 17.06.2022, 9.00 – 18.00
 18.06.2022, 9.00 – 18.00
ROOM: online
CP: 3

In this seminar, we will study the neurophysiological basis of human memory formation, storage and retrieval. We will review key studies that investigate how memories are modulated by cognitive factors such as volition or emotion. We will discuss how memories are transformed over time in terms of their representational content and neural substrate (e.g., during systems memory consolidation), and we will review studies conducted in animal models showing that memories can be generated and altered artificially. Finally, throughout the sessions we will discuss the possible implications of these findings to society (e.g. in the treatment of memory disease).

The number of CogSci students who can attend this seminar is restricted to 5 - 6.

*LECTURE & EXERCISE***INTRODUCTION TO COMPUTATIONAL NEUROSCIENCE
(211046 & 211246)**

PROF. DR. SEN CHENG, MS VINITA SAMARASINGHE

TERM:	Summer 2022
LECTURE:	Monday, 16 – 18 (First Meeting: 04.04.2022)
RECITATIONS:	Friday, 10 – 12 (First Meeting: 08.04.2022)
ROOM:	Online
CP:	6

Computational neuroscience uses quantitative methods to describe what nervous systems do, study how they function, and explain the underlying principles. This class introduces the basics of the mathematical and computational methods used in contemporary neuroscience research. These methods are applied to problems in perception, motor control, learning, and memory.

Knowledge of calculus, linear algebra, and statistics is required for this class, knowledge of neuroscience is not.

Assessment written final exam - 120 min - date: TBA

Course material available on Moodle (registration required)

Literature "Theoretical Neuroscience" by Dayan and Abbott, MIT Press

If this course is used for Module AM4, it cannot be used for C3.

*LECTURE & EXERCISE***COMPUTATIONAL NEUROSCIENCE: VISION AND MEMORY
(211049 & 211249)**

PROF. DR. LAURENZ WISKOTT

TERM:	Summer 2022
LECTURE:	Tuesday, 10.30 – 12.00 (First meeting: 05.04.2022)
EXERCISE:	Tuesday, 12.15 – 13.45 (First meeting: 05.04.2022)
ROOM:	ID 03/419
CP:	6

This lecture covers basic neurobiology and models of selforganization in neural systems, in particular addressing

- Learning
 - Hebbian Learning
 - Neural learning dynamics and constrained optimization
 - Dynamic field theory
- Vision
 - Receptive fields
 - Neural maps
- Hippocampus
 - Navigation
 - Episodic memory
 - Hopfield Network

Prerequisites: Good mathematical skills, linear algebra and calculus.

If this course is used for Module I3, it cannot be used for C3.

SEMINAR

**EVENT COGNITION: MEMORY AND PERCEPTION OF NATURAL-
ISTIC ACTIVITIES (118164)**

PHD DAVID STAWARCZYK

TERM:	Summer 2022
MEETING TIME:	Tuesday, 14 – 16 (First meeting: 05.04.2022)
ROOM:	IA 1/157
CP:	3

Everyday experiences consist in a continuous flow of experience, yet people seem to segment this flow of information automatically and effortlessly into discrete and meaningful event. For instance, one might describe baking a cake by listing the following parts: "Preheating the oven, mixing the ingredients, pouring the dough in a mold, etc." An extended amount of evidence suggests that this segmentation process has pronounced impact in how people perceive, remember, and respond to everyday events. In this seminar, we will use a cognitive neuroscience approach to describe the major aspect of event cognition, that is how people build in mind and update event models of current situations, how such models affect memory encoding, and how are used to guide perception and behavior."

C3

Memory & Learning

*SEMINAR***DISKURS: THE ROLE OF THE HIPPOCAMPUS IN MEMORY – REACTIVATION VS. GENERATION? (118163)**

DR. NORA ALICIA HERWEG

TERM:	Summer 2022
MEETING TIME:	Thursday, 16 – 18 (First meeting: 07.04.2022)
ROOM:	IB 6/127
CP:	3

Episodic memory is often conceptualized as a form of mental time travel in which we revisit past experiences by reactivating brain states that were present at the initial encoding of an episode. In this seminar we will contrast this “reactivation” view with a “generation” view, which states that we do not simply reactivate but actively construct scenarios of the past and the future alike. We will discuss behavioral and neuroscientific evidence with a focus on the hippocampal memory system. Our discussions will be based on studies that use a variety of different recording modalities and analyses methods (single neuron recordings, intracranial EEG, fMRI, multivariate “pattern” analyses).

C3

Memory & Learning

*SEMINAR***REASONING, NORMALITY, AND COGNITIVE BIASES (030078)**

JUN. PROF. DR. PETER BRÖSSEL

TERM:	Summer 2022
MEETING TIME:	Tuesday, 10 – 12 (First meeting: 05.04.2022)
ROOM:	GABF 04/709
CP:	3 - 6

The course will introduce and discuss the most prominent theories of reasoning in cognitive psychology and the different normative frameworks associated with them. In particular, we will analyze how logic, probability, and evolutionary psychology relate to the descriptive study of reasoning and their role in our understanding of the nature and function of cognitive biases.

SEMINAR

HUMOR AND IRONY: PERSPECTIVES FROM PHILOSOPHY AND COGNITIVE SCIENCE (030088)

PROF. DR. MARKUS WERNING

TERM:	Summer 2022
MEETING TIME:	Wednesday, 14 – 16 (First Meeting: 06.04.2022)
ROOM:	GA 04/187
CP:	2-6

This course can be used for C4 or AM2. If it is used for AM2, it cannot be used for C4.

Humor and irony are ubiquitous phenomena in our mental lives: we often refer to situations, persons, or states of affairs in humorous or ironical ways using language, drawings, gestures, and other modes of expression. From a philosophical and scientific perspective, humor and irony are an interesting interface of cognitive and emotional processes. Yet despite the importance and relevance of humor and irony, research in empirically informed philosophy and the cognitive sciences has only begun to understand these phenomena.

In the seminar we will provide an overview of the recent theoretical and empirical literature and discuss the following questions: first, what is humor and how can it be understood from a cognitive science perspective? Second, how can irony be captured theoretically and how can it be studied empirically? Finally, how can we describe the relation between humor and irony?

In addition to active participation and careful preparation of the assigned readings, participants will be expected to give a presentation in English. Assistance regarding the English language will be provided.

Literature:

- Bryant, G. A. (2012). Is verbal irony special? *Language and Linguistics Compass*, 6(11), 673–685.
- Gibbs, R. W., Bryant, G. A., & Colston, H. L. (2014). Where is the humor in verbal irony? *Humor*, 27(4), 575–595.
- Hurley, M., Dennett, D., and Adams, R. (2011). *Inside Jokes: Using Humor to Reverse-engineer the Mind*. MIT Press.
- Ritchie, G. (2020). *The comprehension of jokes: a cognitive science framework*. New York: Routledge.
- Vrticka, P., Black, J. M., & Reiss, A. L. (2013). The neural basis of humour processing. *Nature Reviews Neuroscience*, 14(12), 860–868.

SEMINAR

**COMPOSITIONALITY IN LANGUAGE, MIND AND BRAIN
(030089)**

PROF. DR. MARKUS WERNING

TERM:	Summer 2022
MEETING TIME:	Thursday, 16 – 18 (First Meeting: 07.04.2022)
ROOM:	Room GA 04/187
CP:	2-6

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

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

Literature:

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

SEMINAR

LOGIC AND ARTIFICIAL INTELLIGENCE (030105)

PROF. DR. CHRISTIAN STRÄßER

TERM:	Summer 2022
MEETING TIME:	Friday, 14.00 – 15.30 (First Meeting: 08.04.2022)
ROOM:	Room GABF 04/358
CP:	6

Ideally, the information on the basis of which we make an inference is both complete and consistent: it is conflict-free, and it contains everything that is relevant. In practice, it is often impossible to meet this standard. Decisions need to be made on the basis of the information at hand, and this set of information is often incomplete and/or inconsistent. The resulting inferences are defeasible: they are drawn tentatively, and are open to retraction in the light of further information. Examples of defeasible reasoning are numerous: inductive generalizations, inference to the best explanation, inferences on the basis of expert opinions, reasoning in the presence of inconsistencies, reasoning with priorities, etc. In our everyday practice, as in the practice of experts (e.g. medical diagnosis) or scientists, defeasible inferences are abundant. Since the late 1970s we see a central interest in the discipline of Artificial Intelligence in logical models of defeasible inference. The field of non-monotonic logic covers a variety of formalisms devised to capture and represent defeasible reasoning patterns. Informally, a logic is non-monotonic if under the addition of new premises we may lose some of our previous consequences.

This course will focus on several of the key formalisms of non-monotonic logic (such as default logic, preferential semantics, logic programming and formal argumentation theory, see <https://plato.stanford.edu/entries/logic-nonmonotonic/> for an overview). The course will be organized in different blocks, each devoted to one family of systems. Each block will consist of both theoretical units and exercises. Students will have the opportunity to give presentations on research papers, to write an exam, and to submit essays. The exact timing of the blocks will be agreed upon in an initial meeting.

SEMINAR

INTRODUCTION TO INFERENCEALISM (030102)

SIMON VONLANTHEN

TERM:	Summer 2022
MEETING TIME:	Tuesday, 16 – 18 (First Meeting: 05.04.2022)
ROOM:	Room GA 03/46
CP:	3 - 6

Inferentialism is a contemporary and increasingly popular position in the philosophy of language. It tries to account for linguistic meaning by giving an expression's role in inference pride of place in explaining what the expression means. As such, it forms a systematic attempt at formulating a use-theory of meaning. We will study the general upshots of inferentialism, both on the semantical and the metasemantical level, and consider some of its chief critics. In the second part, we will turn to a standard application of inferentialism in the realm of logic. Specifically, we will discuss the idea that rules of inference determine the meaning of logical constants, and how said meaning can also be identified with those rules of inference. This line of thought faces a standard challenge coming from constants with vicious rules of inference ("tonk"), thus we will also explore potential responses to the issue. The seminar will close with an outlook on inferentialist treatments of other philosophically contentious topics, such as moral and aesthetic discourse.

Prerequisites: basics of formal logic and language philosophy

if needed, specific knowledge in proof theory will be taught during this course

Literature

Brandom, R. B. (2000): *Articulating Reasons*. New York/Cambridge (Mass.): Harvard University Press.
Dummett, Michael (1991): *The Logical Basis of Metaphysics*. Cambridge: Harvard University Press.
Peregrin, Jaroslav (2014): *Inferentialism. Why Rules Matter*, New York: Palgrave MacMillan.
Steinberger, F. & Murzi, J. (2017): "Inferentialism", in: B. Hale, C. Wright & A. Miller (eds.), *A Companion to the Philosophy of Language, Second Edition (Vol. 1)*, Wiley-Blackwell, 197-224.

AM. Advanced Methods

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

AM1

AM1. Theory Formation & Conceptual Analysis

SEMINAR

THEORY OF SELF CONSCIOUSNESS (030084)

PROF. DR. ALBERT NEWEN

(IN COOPERATION WITH PROF. KATJA CRONE)

TERM:	Summer 2022
MEETING TIME:	Monday, 16 – 18 (First Meeting: 04.04.2022)
ROOM:	online
CP:	6

In this seminar, we will explore theories of self-consciousness. This includes a variety of phenomena which are part of or closely related to self-consciousness, namely the sense of agency, of ownership and the phenomenon of perspectivity as well as the role of an autobiographical self and its development. Especially concerning the latter we have to account for the role of memory for our autobiographical self. This seminar is a research-oriented seminar which especially enables the participants to develop a project which leads into a BA-thesis or a master-thesis. It has a focus in philosophy but will involve some psychological texts as well. The main topic is the discussion of modern theories of human self-consciousness. Self-consciousness can be defined as the ability to consciously represent one's own states, especially (but not only) mental states, as one's own (Newen, Vogeley 2003). Concerning self-consciousness, we can distinguish four central questions which allow us to illustrate the wide range of this central debate:

The epistemological question: Do we have a privileged access to our own mental phenomena such that only we can know with certainty which mental phenomena we have?

The ontological question: Is there a self as an ontologically irreducible entity?

The cognitive question: How can we investigate the natural basis of self-c. with the methods of empirical psychology and cognitive neuroscience?

The question about personal identity: What is the criterion of being a person and of remaining the same person?

In the seminar we will discuss texts concerning all dimensions of human self-consciousness. Furthermore, we will discuss the role of episodic memory for a self-model: how can we adequately describe the interaction of a narrative self, i.e. the autobiographical stories a person tells about herself, with her episodic memories? On the one hand, episodic memories are constructed in line with and thus constrained by a narrative self, on the other hand, the narrative self is at least partially constituted by the episodic memories a person has. How can we account for this interdependence and account for the narrative self and its development?

Details for receiving a certificate will be presented at the beginning of the seminar.

The workload involves the standard tools of oral presentations and essay writing.

Presentations and discussions will be in English.

If this seminar is used for module C1, it cannot be used for module AM1.

SEMINAR

**HUMOR AND IRONY: PERSPECTIVES FROM PHILOSOPHY AND
COGNITIVE SCIENCE (030088)**

PROF. DR. MARKUS WERNING

TERM:	Summer 2022
MEETING TIME:	Wednesday, 14 – 16 (First Meeting: 06.04.2022)
ROOM:	GA 04/187
CP:	2-6

This course can be used for C4 or AM2. If it is used for C4, it cannot be used for AM2.

Humor and irony are ubiquitous phenomena in our mental lives: we often refer to situations, persons, or states of affairs in humorous or ironical ways using language, drawings, gestures, and other modes of expression. From a philosophical and scientific perspective, humor and irony are an interesting interface of cognitive and emotional processes. Yet despite the importance and relevance of humor and irony, research in empirically informed philosophy and the cognitive sciences has only begun to understand these phenomena.

In the seminar we will provide an overview of the recent theoretical and empirical literature and discuss the following questions: first, what is humor and how can it be understood from a cognitive science perspective? Second, how can irony be captured theoretically and how can it be studied empirically? Finally, how can we describe the relation between humor and irony?

In addition to active participation and careful preparation of the assigned readings, participants will be expected to give a presentation in English. Assistance regarding the English language will be provided.

Literature:

- Bryant, G. A. (2012). Is verbal irony special? *Language and Linguistics Compass*, 6(11), 673–685.
- Gibbs, R. W., Bryant, G. A., & Colston, H. L. (2014). Where is the humor in verbal irony? *Humor*, 27(4), 575–595.
- Hurley, M., Dennett, D., and Adams, R. (2011). *Inside Jokes: Using Humor to Reverse-engineer the Mind*. MIT Press.
- Ritchie, G. (2020). *The comprehension of jokes: a cognitive science framework*. New York: Routledge.
- Vrticka, P., Black, J. M., & Reiss, A. L. (2013). The neural basis of humour processing. *Nature Reviews Neuroscience*, 14(12), 860–868.

EXERCISE

EXERCISES: LOGIC AND ARTIFICIAL INTELLIGENCE (030106)

PROF. DR. CHRISTIAN STRÄBER

TERM:	Summer 2022
MEETING TIME:	Friday, 15.30 – 17.00 (First Meeting: 08.04.2022)
ROOM:	Room GABF 04/358
CP:	3

This is the exercise unit for the course "Logic and Artificial Intelligence" (*see module C4*). In the exercise unit we will discuss solutions to exercise sheets, you will have more opportunities to ask questions, etc. It is possible to subscribe to the seminar without subscribing to the exercise, but the learning experience will significantly improve with exercising the content of the course.

*LECTURE & EXERCISE***MATHEMATICS FOR MODELING AND DATA ANALYSIS****(211047 & 211247)**

PROF. DR. LAURENZ WISKOTT

TERM:	Summer 2022
LECTURE:	Thursday 10.30 – 12.00 (First Meeting: 07.04.2022)
EXERCISE:	Thursday 12.15 – 13.45 (First Meeting: 07.04.2022)
ROOM:	ID 03/419
CP:	6

This course covers mathematical methods that are relevant for modeling and data analysis. Particular emphasis will be put on an intuitive understanding as is required for a creative command of mathematics. The following topics will be covered:

- Functions and how to visualize them
- Vector spaces
- Matrices as transformations
- Systems of linear differential equations
- Qualitative analysis of nonlinear differential equations

possibly also

- Bayesian theory
- Multiple integrals

Requirements: Basic knowledge of linear algebra and calculus.

If this seminar is used for Module I3, it cannot be used for AM4.

LAB COURSE

INTRODUCTION TO PYTHON (211421)

EDDIE SEABROOK

TERM:	Summer 2022
MEETING TIME:	Block: 05. - 16.09.2022, 10 – 16
ROOM:	PC-Pool 1: IA 0/158-79 / Online
CP:	3

Important: Five seats will be reserved for students from Cognitive Science. After that, the seats will be allocated on a first-come, first-serve basis based on enrollment emails.

Python is a programming language that is widespread among scientists due to its readability and powerful standard libraries. This practical course teaches Python 3 to students with prior experience in other programming languages. In addition to introducing the language itself, we will focus on scientific computing including vectors and matrices as well as data processing and mild machine learning. During the second week, participants will implement a project in Python.

Content

- **Python basics:** syntax, interpreter, control structures, data types, OOP
- **Scientific computing:** NumPy, Matplotlib, scikit-learn
- **Project:** realization of a project in Python

Grading

Grading is based on the project in the second week. If crucial components of Python are not covered in your project, we might also test your knowledge on the subject.

Requirements:

We expect fluency in one other programming language and familiarity with concepts like

- control structures
- data types
- functions
- object-oriented programming

These concepts will not be taught separately.

Registration:

To register for the course, please send an eMail to python@ini.rub.de Include your name, your student ID, your study program and semester and a short explanation about your coding experience (one or two sentences).

For further course information please visit:

https://www.ini.rub.de/teaching/courses/introduction_to_python_summer_term_2022/.

SEMINAR

PROGRAMMIEREN IN MATLAB (118155)

DR. ROLAND PUSCH, PROF. DR. JONAS ROSE

TERM:	Summer 2022
MEETING TIME:	Thursday, 14 – 16 & 16 – 18 (First Meeting: 07.04.2022)
ROOM:	PC-Pool IB 02/109
CP:	6

This course will be held in German language, but there will be a second group in English language, if there are enough interested students. So if you would like that to happen, please apply early.

Programming in Matlab

This course consists of two parts, a Matlab tutorial and a block seminar. Main aspect is a practical introduction to programming in Matlab, which will be trained in weekly meetings and supplemented by time-consuming homework. Moreover, students will participate in a research project and gain an insight into conduction of experiments, data analysis and data interpretation. As part of the practical course, students will plan, program, and conduct their own experiments. Students will then analyze the acquired data using their newly gained programming skills in Matlab. In an additional block seminar, the scientific content of the project will be elaborated. In the end, all three task areas will converge in a report, in which scientific content of the project, acquired data and data analysis are described. In case of any questions, please contact: roland.pursch@rub.de; jonas.rose@rub.de

*LECTURE & EXERCISE***INTRODUCTION TO COMPUTATIONAL NEUROSCIENCE****(211046 & 211246)**

PROF. DR. SEN CHENG, MS VINITA SAMARASINGHE

TERM:	Summer 2022
LECTURE:	Monday, 16 – 18 (First Meeting: 04.04.2022)
RECITATIONS:	Friday, 10 – 12 (First Meeting: 08.04.2022)
ROOM:	Online
CP:	6

Computational neuroscience uses quantitative methods to describe what nervous systems do, study how they function, and explain the underlying principles. This class introduces the basics of the mathematical and computational methods used in contemporary neuroscience research. These methods are applied to problems in perception, motor control, learning, and memory.

Knowledge of calculus, linear algebra, and statistics is required for this class, knowledge of neuroscience is not.

Assessment written final exam - 120 min - date: TBA

Course material available on Moodle (registration required)

Literature "Theoretical Neuroscience" by Dayan and Abbott, MIT Press

If this course is used for Module C3, it cannot be used for AM4.

LECTURE

MENSCHENZENTRIERTE ROBOTIK (136070)

JUN. PROF. DR. LAURA KUNOLD, PROF. DR.-ING BERND KUHLENKÖTTER, PROF. DR. ANNETTE KLUGE

TERM:	Summer 2022
MEETING TIME:	Wednesday, 14 – 17 (First Meeting: 20.04.2022)
ROOM:	tba
CP:	6

Language of instruction: German

Anmeldung: über Moodle-Kurs Menschenzentrierte Robotik (136070-SoSe 2022)
Der erste Vorlesungstermin, 20.4.2022 ist ein Pflichttermin

Die Studierenden werden in fachübergreifenden Gruppen an konkreten Problemstellungen im Bereich der menschenzentrierten Robotik arbeiten. Zur Gestaltung des sozio-technischen Systems aus Mensch(en) und Roboter(n), werden sowohl ingenieurwissenschaftliche als auch psychologische Fragen berücksichtigt.

Vorbereitend hierfür wird aus technischer Sicht eine thematische Einführung in die Historie, Anwendungsfeldern und Funktionsweisen von Robotersystemen gegeben. Dabei wird vor allem auf die mobile Service-robotik und die Mensch-Roboter-Kollaboration eingegangen.

Zur menschengerechten Gestaltung der Interaktion mit der Roboterplattform, wird eine Einführung in psychologische Effekte der Mensch-Technik-Interaktion gegeben, sowie die soziale Robotik und ihre Anwendungsfelder vorgestellt.

Auf dieser Basis bearbeiten die Studierenden dann in interdisziplinären Gruppen individuelle Problemstellungen unter wissenschaftlichen Gesichtspunkten zur Weiterentwicklung einer mobilen Roboterplattform. Hierbei steht thematisch die erfolgreiche Kommunikation und Interaktion zwischen Mensch und Roboter (und der Eindruck des Roboters auf dem Menschen) im Vordergrund. Es besteht die Möglichkeit die ausgearbeiteten Lösungsansätze zu implementieren und somit eine Validierung des Konzeptes durchzuführen.

Die Studierenden werden bei der Projektplanung und dem Projektmanagement unterstützt, indem ihnen die Grundlagen des Projektablaufs für die jeweiligen Projektphasen vermittelt werden. Während der Projektlaufzeit wird durch Zwischengespräche die Projektentwicklung überprüft und reguliert. So werden die in der Lehrveranstaltung vorgestellten Methoden und das erlernte Wissen praktisch angewendet und das Arbeiten in interdisziplinären Projektgruppen eingeübt.

Prüfung: Anfertigung einer kurzen Dokumentation und Präsentation der Ergebnisse

Voraussetzungen für die Vergabe von Credits:

- Teilnahme an allen Zwischengesprächen
- Aktive Teilnahme an der Projektarbeit
- Bestandene Modulabschlussprüfung: Dokumentation und Präsentation

BLOCK SEMINAR
NEUROEPIGENETICS (118161)
DR. VANESSA LUX

TERM:	Summer 2022
MEETING TIME:	Preliminary Meeting: Thursday, 07.04.2022, 14 – 16 (IA 1/87) Block: Friday, 06.05.2022, 9 – 18 (IA 03/466) Saturday, 07.05.2022, 9 – 18 (IA 1/87)
ROOM:	IA 1/87, IA 03/466
CP:	3

Neuroepigenetics studies epigenetic modifications in neuronal cells. First evidence indicates that epigenetic mechanisms regulating neuronal cell expression contribute to cell differentiation, brain development, learning, and memory. Students will get familiar with the most studied epigenetic mechanisms (DNA methylation, histone modifications, and RNA interference) and underlying models of gene-environment interaction. We will delve into current topics in developmental neurobiology, memory research, learning, and stress research, and learn about first findings. Moreover, we will discuss possibilities and limits of neuroepigenetics and its methods (molecular analyses, animal models, peripheral biomarkers) for psychological research questions.

The course is organized in a workshop format (Blockseminar): After a short general introduction to the topic, students will work in groups on different subtopics and methods, and present their results in different formats (poster, panel discussions, commentaries) in class. As an add-on, participants will learn strategies how to read and evaluate research papers efficiently. The course is taught in English.

SEMINAR

**JOURNAL CLUB - MAGNETO- AND
ELECTROENCEPHALOGRAPHY IN COGNITIVE NEUROSCIENCE**
DR. MARKUS WERKLE-BERGNER

TERM:	Summer 2022
MEETING TIME:	Thursday, 16 – 18 (First Meeting: 07.04.2022)
ROOM:	IB 02/139
CP:	3

We will read and discuss novel trends in M/EEG technology and analysis techniques for the use in modern cognitive neuroscience applications.

Literature: Literature will be given in the beginning of the course.

*PRACTICAL COURSE***MOLEKULARE PSYCHOLOGIE: MOLEKULARGENETISCHES
GRUNDPRAKTIKUM 1A (118156) OR 1B: (118159)**

DR. DIRK MOSER

TERM:	Summer 2022
MEETING TIME:	Preliminary Meeting: Monday, 11.04.2022, 13.00 (IB 5/103 or Zoom) both blocks: 1 week at the start of the summer semester break Monday to Friday, 9 – 13
ROOM:	IB 5/103
CP:	3

Language of instruction: German

Es kann nur eine der beiden Veranstaltungen belegt werden.

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

Voraussetzungen: Teilnahmevoraussetzung sind gute bis sehr gute Kenntnisse in Biologie/ Molekularbiologie/Psychobiologie

Literatur: Skript (wird nach der Vorbesprechung verteilt)

BLOCK SEMINAR & PRACTICAL COURSE
NEUROPSYCHOLOGICAL METHODS: EEG
(118157, 118158)

DR. LAURA-ISABELLE KLATT & DR. JULIAN ELIAS REISER

TERM:	Summer 2022
MEETING TIME:	Preliminary Meeting: 27.04.2022 16:00 (online via Zoom)
	Lab & Seminar: 14.05.2022 & 15.05.2022 9-18
	09.07.2022 & 10.07.2022 9-18
ROOM:	IA 1/157
CP:	6

Please make early decision and contact the lecturers running the courses: Please notice the entry conditions of the courses.

SEMINAR: Seminar course neuropsychological methods: EEG (118158)
& LAB (Laboratory Course): Practical course neuropsychological methods: EEG (118157):

Students must enroll for both the "practical course" and the "seminar course". Participation in both courses is mandatory to complete the module. The goal of the course is to be able to independently conduct and analyze a basic EEG study. On the basis of published neuropsychological literature, students will develop a research question and present the results of the experiment in a written report, according to the publishing standards of neuroscientific journals. The basic skills and literature will be discussed in the seminar. As of now, this course is planned to be held as in-person seminar, including data collection in the EEG laboratory. A first organizational meeting will be held online via Zoom. Along with the in-person meetings, additional materials and assignments will be provided on Moodle. The course language is English.

Requirements: Participation in both courses is mandatory for completion,
 basic knowledge of neuropsychology

AM6

AM6. EEG-training

SEMINAR

NEUROPSYCHOLOGISCHE VERHALTENSSTUDIEN

ENTWICKELN UND DURCHFÜHREN

(118151)

DR. RER. NAT. JOHANNES JUNGILLIGENS

TERM:	Summer 2022
MEETING TIME:	Monday, 10 – 12 (First Meeting: 04.04.2022)
ROOM:	IA 02/460
CP:	3

Language of instruction:

German; depending on the group composition this seminar can also be held in English

How to develop and implement neuropsychological behavioral studies

The objective measurement of behavioral aspects has an important role in cognitive neuroscience as a complement to questionnaires and neurobiological measures, for example in the context of clinical neuropsychological and basic research studies. In this seminar, the most important aspects in planning and implementing such studies, especially with regard to the development of neuropsychological behavioral paradigms, will be elaborated and put into practice.

The aim of the course is to enable participants to independently develop and conduct a study involving neuropsychological behavioral measurement.

SEMINAR

fMRI: A TECHNIQUE TO HACK THE BRAIN (118160)

DR. RER. NAT. MEHDI BEHROOZI

TERM:	Summer 2022
MEETING TIME:	Wednesday, 10 – 12 (First Meeting: 06.04.2022)
ROOM:	Online/Scanner Center
CP:	3

Limit: 15 students with priority for Cognitive Science students. Those who are interested in this course must send an email to Dr. Mehdi Behroozi: mehdi.behroozi@ruhr-uni-bochum.de

During the past two decades, technological leaps in advanced analytical methods, as well as higher temporal and spatial resolution, turned functional magnetic resonance imaging (fMRI) into a neuroscientific core technique to study human and non-human brain functions. Thus, it is essential to learn the basics of fMRI for those who want to make their career out of this technique. This course will be divided into two kinds of sessions:

This course will take place in two sections:

The theoretical sessions will cover the physics and physiology of fMRI, and the relationship between neuronal and BOLD activity patterns.

The practical sessions will focus on data preprocessing (motion correction, slice time correction, spatial smoothing, temporal filtering, etc) and post-processing (GLM, MVPA) techniques and how they can be used to learn about the neuronal mechanisms underlying various cognitive abilities. Besides, students will visit the human and animal scanner center to get familiar with the fMRI machine and learn about data collection.

The theoretical part will be held online. If the corona crisis allows it, the lab sessions will take place and we will visit the scanner center. If the corona regulations do not allow for sessions in presence, we will work more on advanced data processing techniques such as Multi-voxel pattern analysis (MVPA).

D. Free Selection

Please notice that under the category "free selection" we only list courses held in German as additional offers. Please notice that you are only allowed to have maximally 12 CP from courses in German in the whole program.

Furthermore, any other course of the Cognitive Science Master Program can be counted as part of the free selection module, i.e., if you have completed (or have a clear plan of how you will complete) the obligatory modules, you may choose any additional courses from any module and credit them as part of the free selection module.

Additionally, it is possible to credit internships with up to 10 CPs in the category of free selection. The internship must of course be equivalent in working hours to the number of credit points and it must qualify for the Cognitive Science Master Program (ideally supporting your master thesis). If you aim to credit an internship as part of this module, then please contact the program coordinator (cogsci-info@rub.de) in advance.

D1	Free Selection
	<i>LECTURE</i> KOGNITION UND GEHIRN (112611) PROF. DR. OLIVER WOLF
TERM:	Summer 2022
MEETING TIME:	Monday, 14 – 16 (First Meeting: 04.04.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

Falls es zu Online-Lehre kommt wird diese Vorlesung asynchron angeboten.

Die Vorlesung bietet einen Überblick über Befunde und Theorien zu aktuellen Themen der kognitiven Neurowissenschaft. Die Vorlesung setzt Grundkenntnisse der Kognitionspsychologie und der Biopsychologie voraus.

Literatur wird zu Beginn der Veranstaltung bekannt gegeben und wird im Moodle zur Verfügung gestellt.

D1

Free Selection

*SEMINAR***GENETIK UND EPIGENETIK PSYCHISCHER STÖRUNGEN
(118162)**

DIPL. BIOL. ELISABETH HUMMEL

TERM:	Summer 2022
MEETING TIME:	Tuesday, 12 – 14 (First Meeting: 05.04.2022)
ROOM:	IB 02/135
CP:	3

Only 2 people may join. If you are interested, please send an application to Elisabeth Hummel (elisabeth.hummel@rub.de)

Language of instruction: German

In diesem Seminar wird über aktuelle Forschungsergebnisse aus der molekularen Verhaltensgenetik diskutiert. Im Fokus stehen dabei Befunde der psychiatrischen Genetik, sowie Ergebnisse zu Gen-Umwelt-Interaktionen, Genexpression und der Epigenetik. Beispielsweise wird die Frage nach den Mechanismen behandelt, wie sich frühe Umweltfaktoren „biologisch festschreiben“ (biological embedding of experience), und welche Rolle dabei epigenetische Prozesse spielen. Außerdem wird der Nutzen von Biomarkern besprochen. Die genaue Auswahl der Literatur findet in Absprache mit den Teilnehmern statt. Aktuelle Publikationen werden besprochen und methodenkritisch analysiert

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

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

TERM:	Summer 2022
MEETING TIME:	Thursday, 16 – 18 (First Meeting: 07.04.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

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

In der Vorlesung sollen folgende Themen behandelt werden:

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

*LECTURE***BIOPSYCHOLOGIE (112631)**

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

TERM:	Summer 2022
MEETING TIME:	Monday, 16 – 18 (First Meeting: 04.04.2022)
ROOM:	HIA
CP:	3

Language of instruction: German

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

Literatur:

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

Bekanntgabe weiterer aktueller Literatur während der Veranstaltung und über Moodle.

D1

Free Selection

BLOCK SEMINAR
NEUROPSYCHOLOGISCHE REHABILITATION I (118121)
OR II (118124)
PROF. DR. BORIS SUCHAN

TERM: Summer 2022

MEETING TIME: **Block I:** Thursday, 23.06.2022 9 – 17 (IB 02/135) &
Friday, 24.06.2022 9 - 17 (IB 02/109 PC-Pool)

OR

Block II: Thursday, 30.06.2022, 9 – 17 (IB 02/135) &
Friday 01.07.2022, 9 - 17 (IA 02/445)

ROOM: IB 02/135, IB 02/109 or IB 02/135, IA 02/445

CP: 3

Language of instruction: German

Es kann nur eine der beiden Veranstaltungen belegt werden.

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.

Literaturhinweise: Eine Literatur ist zu Beginn des Seminars erhältlich

SEMINAR

LERNEN UND PROBLEMLÖSEN (030268)

PROF. DR. NIKOL RUMMEL

TERM:	Summer 2022
MEETING TIME:	Wednesday, 14 – 16 (First Meeting: 13.04.2022) Tuesday (26.04.22), 12 – 14 (special date: UNIC project)
ROOM:	GABF 04/358
CP:	3

Language of instruction: German

In diesem Seminar sollen zunächst grundlegende Konzeptualisierungen menschlichen Lernens erarbeitet werden; anschließend werden verschiedene Formen des Lernens kontrastiert (formales, nonformales und informelles Lernen). Der zweite Teil der Veranstaltung beschäftigt sich mit dem Konzept des Problemlösens. Die Fähigkeit Probleme zu lösen wird als eine der Schlüsselkompetenzen für die Bewältigung von Anforderungen im beruflichen wie privaten Alltag angesehen. Entsprechend stellt sich die Frage, was eine solche Problemlösefähigkeit ausmacht und wie sie erworben werden kann. Gleichzeitig wird Problemlösen als Instruktionsmethode genutzt. Dadurch stellt sich die Frage nach dem Zusammenspiel von Problemlösen und Lernen. Abschließend werden spezifische Situationen, in denen Lernen und Problemlösen stattfinden, betrachtet und die damit einhergehenden Möglichkeiten bzw. Herausforderungen diskutiert.

Die Seminarsitzungen werden mit Impulsreferaten, vertiefenden Diskussionen und Gruppenarbeiten so gestaltet, dass eine aktive und interaktive Auseinandersetzung aller Teilnehmer/innen mit den Inhalten gefördert wird.

Anforderungen für den (unbenoteten) Leistungsnachweis: Lektüre ausgewählter Texte und Bearbeitung von kleinen Aufgaben zur Vorbereitung der Sitzungen; aktive Mitarbeit.

Die Anmeldungen erfolgen in eCampus in der Zeit vom 22.03.2021 (08:00 Uhr) bis zum 31.03.2021 (23:59 Uhr) (mit Ausnahme der Vorlesungen, der gekoppelten Einführungsseminare und der Tutorien). Die Ergebnisse des Anmeldeverfahrens können spätestens ab dem 12.04.2021 in eCampus abgerufen werden.

SECOND YEAR PROGRAM

I. Interdisciplinary Research Module

Choosing a course from C1 - C4 as a substitute for I1 - I4 is only possible if the substitute course is closely connected to your master thesis project.

Please notice that one and the same course can only be accepted as part of a single Module. It is prohibited to use the same course for two different Modules.

Usually, the interdisciplinary research modules should be completed in the third semester (winter semester). To keep flexibility for the students we offer some courses for these modules in the summer semester as well. Please check individually with the lecturer whether the colloquium will be held in English.

I1

I1. Cognitive Philosophy

COLLOQUIUM

RESEARCH COLLOQUIUM: RATIONALITY AND COGNITION (030125)

PROF. DR. PETER BRÖSSEL

TERM:	Summer 2022
MEETING TIME:	Monday, 16 – 18 (First Meeting: 04.04.2022)
ROOM:	GA 03/46
CP:	3 or 6

This research colloquium is devoted to studying reasoning (in a broad sense) both from a descriptive and a normative perspective. In this seminar, we discuss research articles (some of which will be work-in-progress).

*COLLOQUIUM***EXTRA RESEARCH COLLOQUIUM "METAPHILOSOPHY AND EXPERIMENTAL PHILOSOPHY" (030126)**

PROF. DR. JOACHIM HORVATH

TERM:	Summer 2022
MEETING TIME:	Wednesday, 16 – 18 (First Meeting: 06.04.2022)
ROOM:	GAFO 04/619
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.

*COLLOQUIUM***INTERDISCIPLINARY READING CLUB: RECENT DEBATES ON SITUATED COGNITION (030118)**

DR. SABRINA CONINX & PROF. DR. ALBERT NEWEN

TERM:	Summer 2022
MEETING TIME:	Tuesday, 14 – 16 (First Meeting: 05.04.2022)
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 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) & Dr. Sabrina Coninx (sabrina.coninx@rub.de) and come to the first meeting.

*COLLOQUIUM***PHILOSOPHY MEETS COGNITIVE SCIENCE:
MEMORY AND LANGUAGE (030128)**

PROF. DR. MARKUS WERNING

IN COOPERATION WITH PROF. DR. KRISTINA LIEFKE (BOCHUM),
PROF. DR. KOURKEN MICHAELIAN (GRENOBLE), AND DR. ANCO
PEETERS (BOCHUM)

TERM:	Summer 2022
MEETING TIME:	Tuesday, 16.15 – 18.30 (First Meeting: 05.04.2022)
ROOM:	GA 04/187
CP:	2- 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 and Dr. Anco Peeters. The language talks will be hosted together with Prof. Dr. Kristina Liefke. A detailed schedule will be published in due course at <https://www.ruhr-uni-bochum.de/phil-lang/colloquium.html>. Depending on the pandemic situation, the talks will be held either online via Zoom or in person.

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

JUN. PROF. DR. KRISTINA LIEFKE

TERM:	Summer 2022
MEETING TIME:	Wednesday, 17.00 – 19.00 (First Meeting: 06.04.2022)
ROOM:	GA 04/187
CP:	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 by end-March at <https://www.ruhr-uni-bochum.de/phil-inf/colloquium/index.html.en>. In spring 2022, the colloquium will take place in a bi-weekly rhythm.

Assessment: presentation and essay

*COLLOQUIUM***RESEARCH COLLOQUIUM: BELIEF IN CONSPIRACY THEORIES AND RATIONALITY (030127)**

DR. NINA POTH, PROF. DR. TOBIAS SCHLICHT

TERM:	Summer 2022
MEETING TIME:	Thursday, 14.00 – 15.30
ROOM:	online
CP:	3-6

One of the leading hypotheses in cognitive science is the claim that cognitive processes are aimed at optimal results prescribed by the norms of Bayesian decision theory. However, this view faces the problem of explaining how people arrive at irrational beliefs, such as conspiracy theories about cellular 5G networks being the cause of the Covid-19 virus, despite abundant evidence against their plausibility. In this colloquium, we will discuss recent literature on rationality, gullibility, and conspiracy theories, accompanied by guest talks from renowned scholars from philosophy, psychology and related fields to investigate the question why people believe weird things.

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 nina.poth@rub.de or tobias.schlicht@rub.de to register for the colloquium and to receive the Zoom-links for the colloquium.

*COLLOQUIUM***RESEARCH COLLOQUIUM: INTERDISCIPLINARY PERSPECTIVES
ON EPISODIC MEMORY (211124)**

PROF. DR. SEN CHENG

TERM:	Summer 2022
MEETING TIME:	Friday, 14.00 – 15.30, variable schedule (First Meeting: 08.04.2022)
ROOM:	Online
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 report on four presentations from three different disciplines

Prerequisites Advanced knowledge of learning and memory

Course material available on Moodle (registration required)

Capacity max. 15 students

Enrollment eCampus

*COLLOQUIUM***RESEARCH COLLOQUIUM: GENETIC PSYCHOLOGY (118911)**

DR. VANESSA LUX

TERM:	Summer 2022
MEETING TIME:	Monday, 16 – 18 (First Meeting: 04.04.2022)
ROOM:	IB 5/103
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 April.

*COLLOQUIUM***SCIENTIFIC COLLOQUIUM: COGNITIVE PSYCHOLOGY AND
PSYCHONEUROENDOCRINOLOGY (118913)****[FORSCHUNGSKOLLOQUIUM KOGNITIONSPSYCHOLOGIE UND
PSYCHONEUROENDOKRINOLOGIE]**

PROF. DR. OLIVER T. WOLF

TERM:	Summer 2022
MEETING TIME:	Tuesday, 16.00 – 18.00 (First Meeting: 05.04.2022)
ROOM:	IA 02/445
CP:	3

synchronously, in case of online- teaching: asynchronously

In this forum, current research projects of the Cognitive Psychology Unit (including master's theses and doctoral projects) are presented. One focus is on experimental stress research. Here, the question "What stresses us" as well as the question "How does stress influence our cognitive skills" are of interest. In addition, invited guests from other working groups of the faculty, from adjacent faculties of the RUB or from other universities will present current research findings on cognitive psychology or psychoneuroendocrinology.

A schedule will be available on the LS homepage from the beginning of April.

*LECTURE & EXERCISE***MATHEMATICS FOR MODELING AND DATA ANALYSIS****(211047 & 211247)**

PROF. DR. LAURENZ WISKOTT

TERM:	Summer 2022
LECTURE:	Thursday 10.30 – 12.00 (First Meeting: 07.04.2022)
EXERCISE:	Thursday 12.15 – 13.45 (First Meeting: 07.04.2022)
ROOM:	ID 03/419
CP:	6

This course covers mathematical methods that are relevant for modeling and data analysis. Particular emphasis will be put on an intuitive understanding as is required for a creative command of mathematics. The following topics will be covered:

- Functions and how to visualize them
- Vector spaces
- Matrices as transformations
- Systems of linear differential equations
- Qualitative analysis of nonlinear differential equations

possibly also

- Bayesian theory
- Multiple integrals

Requirements: Basic knowledge of linear algebra and calculus.

If this seminar is used for Module AM4, it cannot be used for I3.

*LECTURE & EXERCISE***AUTONOMOUS ROBOTICS: ACTION, PERCEPTION, AND COGNITION (211048 & 211248)**

PROF. DR. GREGOR SCHÖNER

TERM:	Summer 2022
LECTURE:	Thursday, 14.15 – 16.00 (First Meeting: 07.04.2022)
EXERCISE:	Thursday, 16.15 – 17.00 (First Meeting: 14.04.2022)
ROOM:	online
CP:	6

Autonomous robotics is an interdisciplinary research field in which embodied systems equipped with their own sensors and with actuators generate behavior that is not completely pre-programmed. Autonomous robotics thus entails perception, movement generation, as well as core elements of cognition such as making decisions, planning, and integrating multiple constraints.

This course touches on various approaches to this interdisciplinary problem. In the first half of the course, the main emphasis will be on dynamical systems methods for generating movement in vehicles. The main focus of the course is, however, on solutions to autonomous movement generation that are inspired by analogies with how nervous systems generate movement. The second half of the course will review core problems in human movement science, including the degree of freedom problem, coordination, motor control, and the reflex control of muscles.

If this seminar is used for Module C2, it cannot be used for I3.

Requirements

The emphasis of the course is on learning concepts, practicing interdisciplinary scholarship including reading and writing at a scientific and technical level. Mathematical concepts are used throughout, so understanding these concepts is important. Mathematical skills are not critical to mastering the material, but helpful. The mathematics is mostly from the qualitative theory of dynamical systems, attractors and their instabilities. Short tutorials on some of these concepts will be provided.

Exercises

The course is accompanied by exercises, which will be posted weekly. Participants will upload their solutions, which will be corrected and marked (for bonus points). The exercises and their solutions will be discussed by Rachid Ramadan in the weekly exercise live session.

You can register here: <https://www.ini.rub.de/elearning/?eid=350>

Find more information on the INI web page (https://www.ini.rub.de/teaching/courses/autonomous_robotics_action_perception_and_cognition_summer_term_2022/)

*LECTURE & EXERCISE***COMPUTATIONAL NEUROSCIENCE: VISION AND MEMORY
(211049 & 211249)**

PROF. DR. LAURENZ WISKOTT

TERM:	Summer 2022
LECTURE:	Tuesday, 10.30 – 12.00 (First meeting: 05.04.2022)
EXERCISE:	Tuesday, 12.15 – 13.45 (First meeting: 05.04.2022)
ROOM:	ID 03/419
CP:	6

This lecture covers basic neurobiology and models of self-organization in neural systems, in particular addressing

- Learning
 - Hebbian Learning
 - Neural learning dynamics and constrained optimization
 - Dynamic field theory
- Vision
 - Receptive fields
 - Neural maps
- Hippocampus
 - Navigation
 - Episodic memory
 - Hopfield Network

Prerequisites: Good mathematical skills, linear algebra and calculus.

If this course is used for Module C3, it cannot be used for I3.

SEMINAR

JOURNAL CLUB: LEARNING AND MEMORY (211125)

PROF. DR. SEN CHENG

TERM:	Summer 2022
MEETING TIME:	Tuesday, 14.00 – 15.30 (First Meeting: 05.04.2022)
ROOM:	Online
CP:	3

We will discuss the latest research results in learning and memory at the systems level. Each session will consist of either a journal club based on a published article or a research talk. Journal club meetings will include a presentation of the article by one of the participants and a discussion by all. Research talks will be given by members of the computational neuroscience group or external invited guests. Some meetings will be held via video conferencing with participants from the USA. To accommodate the schedule of external participants, some meetings might have to be moved to a different date and time. The topics to be discussed will focus on the functional role of the mammalian hippocampus in spatial navigation and episodic memory. They will cover a diverse set of approaches: electrophysiology, imaging, computational modeling, and robotics. Students will select the articles in consultation with the instructor.

Assessment: presentation in class

Prerequisites: advanced knowledge of learning and memory

Course material: available on Trello (www.trello.com/b/ETWOpTnY)

Capacity: max. 15 students

Enrollment: eCampus

*COLLOQUIUM***COLLOQUIUM: NEURAL BASIS OF LEARNING (118923)**

PROF. DR. JONAS ROSE

TERM:	Summer 2022
MEETING TIME:	Friday, 12 – 14 (First meeting: 08.04.2022)
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 from the beginning of April.

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14. Cognitive Neuroscience

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

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

TERM:	Summer 2022
MEETING TIME:	Monday, 13 – 15 (First meeting: 04.04.2022)
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/>.

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14. Cognitive Neuroscience

*COLLOQUIUM***RESEARCH COLLOQUIUM NEUROPSYCHOLOGY (118912)**

PROF. DR. NIKOLAI AXMACHER

TERM:	Summer 2022
MEETING TIME:	Thursday, 14 – 16 (First Meeting: 07.04.2022)
ROOM:	IB 6/127
CP:	3

Presentation of ongoing research, as well as lectures by guest lecturers on clinical neuropsychological topics. A schedule with information about topics and speakers will be announced at the beginning of the semester via notice board and on the homepage: <http://www.ruhr-uni-bochum.de/neuropsych/>.

An important aim of this course, and basis for successful participation and grading, is a regular and active participation in the scientific discourse.