Master program "Mind and Brain"

Berlin School of Mind and Brain

Humboldt-Universität zu Berlin

Summer Semester 2023

Monday	Tuesday	Wednesday	Thursday	Friday
10:00 – 11:30 Haynes et al. Neuroimaging	10:15 – 11:45 Brass Empirical Research Training (MIND Track)	10:15 – 11:45 Brass Empirical Research Training (BRAIN Track)	10:15 – 11:45 Kaltwasser Emotion Science	10:30 – 12:00 Haynes Psychology and Neuroscience of Intelligence (B)
12:15-13:45 Knoeferle / Pulvermüller Language and the Brain	12:15 – 13:45 Brass Empirical Research Training (MIND Track)	12:15 – 13:45 Brass Empirical Research Training (BRAIN Track)		13:00 – 14:30 Haynes Dissecting and Critiquing Experiments in Cognitive Neuroscience (B)
14:15 – 15:45 Pauen Current Issues in the Philosophy of Mind and in Neuroscience		14:15 – 15:45 Tutorial: Jahn Ethics and Neuro-science	14:15 – 15:45 Hartung / Krohn et al. Maps and measures - Applied neuroscience methods to study the brain in health and disease	15:00 – 16:30 Tutorial: Knechtges / Pataroyo Language and the Brain
	14:30 – 16:00 Tutorial: Finke / Schultze-Kraft / Weber Neuroimaging	15:00 – 16:30 Brass Research Colloquium (B)	16:15 – 17:45 Hipólito Writing and Argumentation (M)	
18:15-19:45 Pauen Philosophical Colloquium (M)	16:30 – 18:00 Tutorial: Finke / Schultze-Kraft / Weber Neuroimaging	16:15 – 17:45 Hipólito Philosophy of Computational Neuroscience (M)		

Comprehensive Course Calendar

Mandatory Lectures

Monday 10:00 – 11:30 *start: 24 April 2023*

Neuroimaging

Prof. Dr. John-Dylan Haynes et al. (Bernstein Center for Computational Neuroscience Berlin)

Venue: Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

Mind and Brain students only!

The course provides an introduction to a number of key non-invasive research methods in structural and functional neuroimaging. Participating students will learn about the basics of functional MRI, EEG, and TMS including technological and physiological foundations, experimental design and basic and advanced statistical methods. The goal is to provide an understanding of functional neuroimaging that will allow students to design, perform and analyze their own studies.

Monday 12:15 – 13:45 *start: 24 April 2023*

Language and the Brain

Prof. Dr. Pia Knoeferle (Institut für Deutsche Sprache und Linguistik, HU Berlin) / Prof. Dr. Dr. Friedemann Pulvermüller (Institut für Deutsche und Niederländische Philologie, FU Berlin)

Venue (HU): Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

Venue (FU): Freie Universität Berlin, Habelschwerdter Allee 45, 14195 Berlin, room KL 32/123

The course takes place at two Venues simultaneously: Prof. Pulvermüller will teach his sessions in person in the seminar room at Freie Universität and they will be streamed at the lecture hall of Bernstein Center. Prof. Knoeferle will teach her sessions in person at the lecture hall of Bernstein Center and students at FU can follow them via live stream.

Language has been investigated from a range of perspectives. Linguists have described it as a formal system focusing on levels that range from phonology to syntax, semantics and pragmatics. Both linguists and psychologists worked on models focusing on the time course of linguistic processing, so that these psycholinguistic models could be tested in behavioral experiments. Neuro- and cognitive scientists have attempted to spell out the brain mechanisms of language in terms of neuronal structure and function by specifying language-relevant areas, 'networks', neuronal assemblies and their interactions. Most recently, explicit biologically inspired modelling and neural network research aim at imitating and explaining language circuits in the human brain, following Feynman's insight that "What I cannot create, I do not understand". These efforts are founded in neuroscience data about the event-related brain potentials and the brain loci that activate when specific linguistic operations occur, the time course of their activation and the linguistic effects of focal brain lesions.

The lecture series will provide a broad introduction into these linguistic, psycholinguistic and neurolinguistic research streams and highlight a variety of cutting-edge behavioral, neuroscience and computational findings addressing a broad range of linguistic issues, including, for example, the recognition of words, the parsing of sentences, the computation of the meaning and of the communicative function of language. Likewise, language development and language disorders will be in focus. Further emphasis will lie on theoretical and computational models of language processing built by psycho- and neurolinguists, which range from abstract box-and-arrow diagrams of the language (processing) system to computationally implemented models and neural network models mimicking the structure and function of the human brain. To evaluate these models, we will review experimental findings involving a broad range of behavioral (reaction time studies, eye tracking), neuroimaging (EEG, MEG, fMRI, NIRS) and neuropsychological methods (patient studies, TMS, tDCS).

Complementing the lecture series, a tutorial will be offered jointly by Johanna Knechtges, research assistant at the Brain Language Laboratory of the Freie Universität, and Angela Patarroyo, PhD candidate in the SFB 1412 "Register". The tutorial will deepen the lecture contents, in part by discussing relevant articles with theoretical and experimental focus. Together with the lectures, the tutorial will familiarize students with current research in the field of language and the brain.

This lecture series is open to students at the Berlin School of Mind and Brain as well as for students of linguistics at HU and FU Berlin.

Readings (course preparation):

Knoeferle, P., & Guerra, E. (2016). Visually situated language comprehension*. Linguistics and Language Compass*, 10(2), 66–82. doi: 10.1111/lnc3.12177

Knoeferle, P. (2021). Grounding language processing: The added value of specifying linguistic/compositional representations and processes. *Journal of Cognition*, 4, 1-14, doi: 10.5334/joc.155.

Pulvermüller, F. (2018). Neural reuse of action perception circuits for language, concepts and communication. *Progress in Neurobiology*, 160, 1-44. doi: 10.1016/j.pneurobio.2017.07.001

Pulvermüller, F., Tomasello, R., Henningsen-Schomers, M. R., & Wennekers, T. (2021). Biological constraints on neural network models of cognitive function. *Nature Reviews Neuroscience*, 22(8), 488-502. doi: 10.1038/s41583-021-00473-5

Tuesday 10:15 − 13:45 *(MIND Track)* *start: 18 April 2023*

Wednesday 10:15 − 13:45 *(BRAIN Track)* *start: 19 April 2023*

Empirical Research Training

Prof. Dr. Marcel Brass (Berlin School of Mind and Brain / Institut für Psychologie, HU Berlin)

NEW VENUE Tuesday (Mind Track): Humboldt Graduate School, Luisenstraße 56, 10117 Berlin, room 122 (ground floor)

Venue Wednesay (Brain Track): Hauptgebäude Lebenswissenschaftliche Fakultät, Invalidenstraße 42, 10115 Berlin, Lecture Hall 2 (second floor)

Mind and Brain students only!

In the empirical-experimental exercise students apply and deepen their basic knowledge of neurocognitive research methods. The objective of the class is to familiarize students with experimental research by providing "hands-on" experience in designing, conducting, analyzing, interpreting, and writing up one experimental study. The empirical-experimental exercise is concluded with a documented individual report on the empirical project following APA guidelines.

As a result of careful study and fulfillment of the course assignments, students should be able to:

1. Identify relevant research problems in cognitive neuroscience
2. Formulate research hypotheses that can be empirically investigated
3. Design experimental neurocognitive studies
4. Understand the ethical implications of the research
5. Apply principles of open and reproducible science
6. Execute experimental studies by collecting research data under carefully controlled conditions
7. Summarize and statistically analyze research data
8. Evaluate research results and draw conclusions pertaining to hypotheses
9. Communicate research studies in oral, written, and poster formats

Mandatory Tutorials

Tuesday 14:30 – 18:00 *start: 25 April 2023*

Tutorial: Neuroimaging

Dr. Matthias Schultze-Kraft (Bernstein Center for Computational Neuroscience), Prof. Dr. Carsten Finke (Charité – Universitätsmedizin Berlin), Simon Weber (M.Sc.) (Bernstein Center for Computational Neuroscience),

Venue: Computer Pool BCCN, Institut für Biologie, Philippstr. 13, House 2, 10115 Berlin (side entrance)

Mind and Brain students only!

The participants will be split up in two groups who will have double-sessions on alternating weeks.

Further information follows soon!

Wednesday 14:15 – 15:45 *start: 19 April 2023*

Tutorial: Ethics and Neuroscience

Marcel Jahn (M.A.) (Institut für Philosophie, HU Berlin)

Venue: Hauptgebäude Lebenswissenschaftliche Fakultät, Invalidenstraße 42, 10115 Berlin, room 1152 (1st floor)

Neuroscientific research has made rapid progress in recent years, leading to a deeper understanding of how the human brain works, developing novel treatments for neurological diseases, and finding ways to enhance brain function. While these scientific achievements are undoubtedly groundbreaking, they have also raised countless ethical issues that are the subject of much controversy today. In this seminar, students will explore key topics that have emerged at the intersection of ethics and neuroscience. In the first part of the course – the ethics of neuroscience – students will engage vital ethical questions that arise from our growing understanding of the brain and our increasing ability to monitor and intervene in brain function. In particular, students will investigate questions such as: to what extent, if at all, is cognitive enhancement morally permissible? Might we even have a moral obligation to enhance human cognitive function? What ethical issues arise with technologies such as (adaptive) deep brain stimulation, designed to treat neurological diseases by profoundly interfering with brain processes? Through discussion of these questions, students will learn about the various ways in which neuroscience can benefit from ethical reflection. Conversely, the second part of the course – the neuroscience of ethics – explores in what ways traditional debates in applied and normative ethics can benefit from recent advances in neuroscience. For example, does neuroscientific evidence show that we have no free will, which many philosophers consider an essential component of moral responsibility? In addition to gaining insights into central topics within both neuroscience and ethics, throughout the course students will also familiarize themselves with key methods of philosophical writing and argumentation, thus acquiring the fundamental tools to approach their own research questions.

Friday 15:00 – 16:30 *start: 28 April 2023*

Tutorial: Language and the Brain

Johanna Knechtges (M.A.) (FU Berlin) / Angela Pataroyo (M.Sc.) (HU Berlin)

Venue: Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

The tutorial will complement the lecture "Language and the Brain" by familiarizing students with current research questions regarding language and the brain, as well as the current methods and paradigms used to address these questions. The class will focus on group discussions of articles which investigate the underlying neuronal mechanisms of language, how humans use words to communicate ideas, how language may influence our perception, and current theories of embodied cognition.

Elective Courses:

Focus MIND

Monday 14:15 – 15:45 *start: 24 April 2023*

Current Issues in the Philosophy of Mind and in Neuroscience

Prof. Dr. Michael Pauen (Berlin School of Mind and Brain / Institut für Philosophie, HU Berlin)

Venue: Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

The seminar will focus on recent papers presenting essential developments in philosophy and neuroscience with a specific focus on the discussion between cognitive- and noncognitive theories of consciousness and related empirical work on no-report paradigms, recent research on pain, including the role of the motor system in the control and attenuation of pain experience, and more recent work on the measurement of consciousness.

Papers will be made available via Moodle one month before the beginning of the Semester.

Wednesday 16:15 – 17:45 *start: 19 April 2023*

Philosophy of Computational Neuroscience

Dr. Inês Hipólito (Berlin School of Mind and Brain / Institut für Philosophie, HU Berlin)

Venue: Hauptgebäude Lebenswissenschaftliche Fakultät, Invalidenstraße 42, 10115 Berlin, room 1152 (1st floor)

MIND

Can cognition be sufficiently understood by looking into neural activity alone? In this course we will study and discuss in depth philosophical questions at the foundations of scientific psychology, cognitive science, and (computational) neuroscience. We will study closely the relationship between psychological and neuroscientific explanations, the nature and the role of mental representations, predictive coding and Bayesian models of the brain. First we will critically examine the aspects of psychological experience (William James, Wittgenstein, Anscombe), to then think about the epistemic role, if any, of these aspects in the cognitive modelling of neural activity and brain data analysis. Second, we will then focus on examining cognitive models (from neural networks, predictive coding to complexity science) from an E-cognition perspective.

Textbooks:

van Geert, P., & de Ruiter, N. (2022). *Toward a Process Approach in Psychology: Stepping into Heraclitus' River*. Cambridge University Press.

Fuchs, T. (2017). *Ecology of the brain: The phenomenologyand biology of the embodied mind*. Oxford University Press.

Thursday 16:15 – 17:45 *start: 20 April 2023*

Writing and Argumentation

Dr. Inês Hipólito (Berlin School of Mind and Brain / Institut für Philosophie, HU Berlin)

Venue: Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

MIND

Critical thinkers rigorously question ideas and assumptions rather than accepting them at face value. They seek to determine whether the ideas, arguments and findings represent the entire, accurate picture. In this seminar, we will specifically focus on developing skills in argumentation and writing. We will understand the links between ideas, recognize, build and appraise arguments, identify inconsistencies and errors in reasoning, reflect on the justification of assumptions, beliefs and values. We will do so by learning to apply and think according to the techniques of propositional logic. By the end of the seminar students should be able to approach (philosophical) problems in a critical and systematic way to work through and become more reflexive about theories and methods in their respective, multiple fields.

Focus BRAIN

Thursday 10:15 – 11:45 *start: 20 April 2023*

Emotion Science

Dr. Laura Kaltwasser (Berlin School of Mind and Brain)

Venue: Hauptgebäude Lebenswissenschaftliche Fakultät, Invalidenstraße 42, 10115 Berlin, Lecture hall 19 (ground floor)

Brain

This interdisciplinary master's seminar on Emotion Science is divided into two parts: From William James to Andrea Scarantino, the first block provides a comprehensive overview over prominent historical and contemporary emotion theories. In the second block we peek into the most influential experiments and investigations of emotion by integrating methods from Affective Computing to Affective Neuroscience.

Thursday 14:15 – 15:45 *start: 20 April 2023*

Maps and measures – Applied neuroscience methods to study the brain in health and disease

Dr. Tim Hartung, Dr. Stephan Krohn, Dr. Joseph Kuchling, Maron Mantwill (M.Sc.), Amy Romanello (M.Sc.), Lars Schlenker (M.Sc.) (Charité – Universitätsmedizin Berlin)

Venue: Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

„Without data, you're just another person with an opinion." Although Deming likely did not have the brain in mind when phrasing his famous aphorism, the analysis and interpretation of data lies at the core of studying brain structure, function, and behavior in human neuroscience.
In this seminar, we will highlight a variety of approaches to study the brain empirically, with a focus on non-invasive neuroimaging techniques with magnetic resonance imaging (MRI).
We will see how machine learning can be used to identify biomarkers of neurological diseases and look at unique and stable patterns of brain activity ('fingerprints') that can be used to identify single individuals within large study groups. We will highlight translational approaches with animal neuroimaging and look at key technological advancements such as ultra-high-field imaging at 7 Tesla and multi-parameter mapping (MPM) that allow us to study brain microstructure quantitatively. Furthermore, we will see how analytical concepts from complexity theory can be applied to MRI data to provide fundamentally new accounts of brain structure and function. Not least, we will highlight how neuropsychological assessment can be used to capture cognitive performance empirically.

All these topics will be introduced in an interactive manner and illustrated by real research projects from our group, spanning from healthy participants to a range of neurological pathologies.

Friday 10:30 – 12:00 *start: 28 (!) April 2023*

Psychology and Neuroscience of Intelligence

Prof. Dr. John-Dylan Haynes (Berlin School of Mind and Brain / Bernstein Center for Computational Neuroscience)

Venue (HU): Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

BRAIN

This seminar will provide an introduction to the psychology and neuroscience of intelligence in light of recent developments in AI. We will address several key topics: (1) Early beginnings and history of intelligence research; (2) The challenge of defining intelligence; (3) Psychometric approaches to intelligence and intelligence tests; (4) The neuroscience of intelligence; (5) Links between human neurocognitive intelligence research and artificial intelligence; (6) How does human and machine intelligence compare?

Friday 13:00 – 14:30 *start: 28 (!) April 2023*

Dissecting and Critiquing Experiments in Cognitive Neuroscience

Prof. Dr. John-Dylan Haynes (Berlin School of Mind and Brain / Bernstein Center for Computational Neuroscience)

Venue: Bernstein Center for Computational Neuroscience, Philippstr. 13., 10115 Berlin, House 6, Lecture Hall (ground floor)

BRAIN

In this course we will learn to critically read and evaluate several classical papers in the field of cognitive neuroscience. We will do a deep dive into the methodological and conceptual aspects of these exemplary studies. We will dissect them together and elaborate three aspects: (1) General: Why was the study done exactly in this way? What is the question the study aims to address? (2) Stengths: What are the key methodological stengths? Is the design compelling? What can we learn from it? (3) Weaknesses and errors: Are there any substantial flaws regarding the methods or the conceptual interpretation? What could have been done better? Would a study be done differently today, and if so how?

Colloquia:

Monday 18:15 – 19:45 *start: 24 April 2023*

Philosophisches Kolloquium / Philosophical Colloquium

Prof. Dr. Michael Pauen (Institut für Philosophie, HU Berlin / Berlin School of Mind and Brain)

Venue: Berlin School of Mind and Brain, Luisenstraße 56, 10117 Berlin, room 220

MIND

The colloquium is open for advanced students and doctoral candidates who are interested in current debates in the philosophy of mind. We will discuss recent research papers as well as papers by the participants.

Participation by appointment only. Please contact Ms Anja Papenfuss if you want to sign up for the colloquium: mb-admin@hu-berlin.de

The research colloquium is held in English!

Wednesday 15:00 – 16:30 *start: 26 April 2023*

Research Colloquium: Social Intelligence

Prof. Dr. Marcel Brass (Berlin School of Mind and Brain)

Venue: Philippstr. 13., 10115 Berlin, House 5, room 009 (Please ring the bell at the entrance)

House 5 is a small building located next to Bernstein Center (House 6) and Ostertag-Haus (House 4) on Campus Nord.

BRAIN

The colloquium is open for advanced students who are interested in social and cognitive neuroscience.

Participation by appointment only. Please contact: mb-socintel@hu-berlin.de

The Research Colloquium is held in English.

If you have questions, please contact

Dr. Dirk Mende

mb-education@hu-berlin.de

NB: The lectures/courses which are flagged as "For Mind and Brain students only!" are for Mind and Brain students ONLY!

Please find information about the course requirements for student of other programs here:

http://www.mind-and-brain.de/master/external-students/

If you are a student of Humboldt-Universität zu Berlin, please register for our courses in the *Überfachlicher Wahlpflichtbereich* section of AGNES!

If you are a student of another university, please print out the Registration as guest auditor / visiting student form you find on our website: http://www.mind-and-brain.de/master/external-students/ **The form has to be signed by the lecturer of the class you plan to attend and the master's program coordinator (Dirk Mende).**