LMU Munich, Department Psychology, Unit of General and Experimental Psychology

M.Sc. in Neuro-Cognitive Psychology

Module Descriptions

2015-2016

TOP 10 2008
International Master's Degree Courses
Made in Germany

M.Sc. in Neuro-Cognitive Psychology; Department Psychology, LMU Munich; Leopoldstr. 13, 80802 Munich, Germany; tel: +49-89-218072537 email: ncp@psy.lmu.de

M.Sc. in Neuro-cognitive Psychology

The aim of the four-semester study program “M.Sc. in Neuro-cognitive Psychology” (NCP) is to educate a selected population of about 12-14 students per annum (recruited world-wide) both methodologically and conceptually in this brain science-oriented discipline of psychology, providing an education that is competitive with the best international programs. The aim of the first two semesters is to transfer, in an optimally structured, broad curriculum, state-of-the-art basic-science knowledge. Subsequently, the second part of the program provides students with the opportunity to specialize and deepen their knowledge in particular “focus” areas, including the ability to choose their own courses. Each course (module) is assessed by a written examination (or equivalent); in the fourth semester students write a supervised M.Sc. Thesis. All courses are open to all students, including those from the fast track in Neurosciences and Ph.D. in Systemic Neurosciences.

Winter semester

NCP Semester	Course	Course title	Responsible lecturer
1	A	Basic Neuro-cognitive psychology 1 (module 1)	Heiner Deubel
1	B	Basic Neurosciences 1 (module 3)	George Boyan
1	C	Classical psychological methods 1 (module 4)	Dragan Rangelov
1	D	Neuro-cognitive methods 1 (module 5)	Agnieszka Wykowska
1	RP1	Research project 1 (module 6)	Markus Conci
3	K	Basic neuro-cognitive research (module 13)	Markus Conci
3	L	Clinical neuro-cognitive research (module 12)	Paul Taylor
3	M	Applied neuro-cognitive research (module 14)	Kathrin Finke
3	N	Neuro-cognitive methods 3 (module 16)	Virginia Flanagin
3	Z	Scientific debating club 2 (module 10)	Thomas Geyer
1 & 3	Y	Colloquium (modules 2, 15)	Hermann Müller

Summer semester

NCP Semester	Course	Course title	Responsible lecturer
2	F	Basic neuro-cognitive psychology 2 (module 7)	Heiner Deubel
2	G	Basic neurosciences 2 (module 8)	Michael Zehetleitner
2	H	Classical psychological methods 2	Markus Paulus
2	I	Neuro-cognitive methods 2 (module 9)	Kathrin Finke
2	Z	Scientific Debating club 1 (module 10)	Thomas Geyer
2	RP2	Research Project 2 (module 11)	Markus Conci
4		Master Thesis (module 17)	Thomas Geyer
2 & 4	Y	Colloquium (modules 2, 15)	Hermann Müller

Winter courses

Foreword

The week before the start of winter semester is intended as orientation week for the new, first semester, NCP students. Both for students in the first as well as third semester courses will start in the first semester week.

Course A: Basic neuro-cognitive psychology 1 (module 1) – first semester

Part A1. Introduction to neuro-cognitive psychology

Course aims and course organization

The course aims at an introduction to neuro-cognitive psychology. It consists of two parts (Course A1 and Course A2). Course A1 provides an overview of current notions concerning attention, perception, learning & memory, and motor control from an integrated experimental-psychological, neurobiological and neuro-computational perspective. Course A2 provides an introduction to the field of neuropsychology.

Course contents

Introduction to the cognitive neuroscience of (1) perception, (2) motor control (3), attention and (4) learning & memory.

Lecturers

Prof. Dr. Heiner Deubel
M.Sc. Saurabh Dhawan
Prof. Dr. Paul Sauseng

Tutors

M. Sc. Nina Hanning

Timetable

Lecture: weeks 1-10, Tue 10:00-12:00, Leopoldstr. 13, room 1209
Tutorial: weeks 1-10, Thu 14:00-16:00, Leopoldstr. 13, room 1407

Week	Date	Topic
1	13.10.2015	Part: Perception
2	20.10.2015	
3	27.10.2015	
4	03.11.2015	Part: Motor control
5	10.11.2015	Part: Attention
6	17.11.2015	
7	24.11.2015	
8	01.12.2015	Part: Learning and memory
9	08.12.2015	
10	15.12.2015	Exam

Requirements for course credit points

Lecture: written examination at the end of Course A1 (15.12.'15)
Tutorial: oral presentation

Reading list

Palmer, S. (1999). Vision Science. Cambridge, Mass.: MIT Press.
Gazzaniga, M.S., Ivry, R.B., &Mangun, G.R. (2002). Cognitive Neuroscience. New York, NY: W.W. Norton. Chapters 1, 5, 6, 7, 8, 11, 12, 14.
Johnson, A. & Proctor, R.W. (2004). Attention. Theory and Practice. Thousand Oaks: Sage Publications.
Monsell, S. & Driver, J. (2000). Attention and Performance XVIII: Control of Cognitive Processes. Cambridge, MA: Bradford Book. Chapter 7.
Roberts, A.C., Robbins, T.W., &Weiskrantz, L. (1998). The prefrontal cortex. New York, NY: Oxford University Press. Chapter 7.
Purves et al. (2008). Cognitive Neuroscience. Sunderland, MA, USA: Sinauer Associates. V. Principles of Memory (Ch. 13-16).

Part A2. Introduction to neuropsychology

Course contents

Introduction to neuropsychology of perception, attention, and executive function; brain plasticity

Lecturer

Prof. Dr. Thomas Schenk

Timetable

Lecture: Tue 12.01. & Tue 19.01.,10:00-12:00, room 1209

Requirements for course credit points

Written examination at the end of part A2 (26.01.'16)

Reading list

Ward, J. (2010). The student's guide to cognitive Neuroscience. Psychology Press: New York, 2nd edition.

Course B: Basic neurosciences 1 (module 3) – first semester

Part B1. Fundamentals in neurosciences

Course aims and organization

The course consists of two parts (Course B1 and Course B2). Course B1 aims at transmitting a general knowledge base in neurobiology. It covers the structure and function of nerve cells in a range of model systems from invertebrates to mammals. Course B2 includes selected topics of advanced functional neuroanatomy based on neuro-imaging data.

Course contents

- Neurons and Glia
- Electrophysiology of nerve cells (Channels, Potentials)
- Synaptic transmission and neurotransmitter systems
- Basic cellular networks
- Motor systems
- Learning and memory

Lecturers

Prof. Dr. George Boyan
Prof. Dr.-Ing. Stefan Glasauer
Prof. Dr. Mark Hübener
Prof. Dr. Tobias Bonhoeffer

Timetable

Lecture: Mon 9:00-11:00 and Thu 9:00-11:00, LMU Biocenter, Großhaderner Str. 2 (B), 82152 Martinsried, room B01.019

Requirements for course credit points

Written examination (exact date / place will be announced by Prof. Boyan)

Reading list:

Bear, M.F., Connors, B.W., & Paradiso, M.A. (2007). Neuroscience. Exploring the brain. Philadelphia, PA: Lippincott Williams & Wilkins.

Part B2. Advanced functional neuroanatomy

Course contents

- Functional brain areas: Visual perception and information representation
- Higher functional areas related to attention
- Functional neuroanatomy: Control of information processing
- Reentrant Processing
- Attention
- Executive functions

Lecturer

PD Dr. Ralph Weidner

Timetable

Lecture and tutorial: Fri 15.01. & Fri 22.01., 10:00-14:00, Leopoldstr. 44, CIP room 511

Requirements for course credit points:

Written examination (Fr, 29.01.16)

Reading list

Literature will be provided in course.

Course C: Classical psychological methods 1: reaction time and psychophysical methods (module 4) – first semester

Course aims

The aim of the course is to provide an overview of "classical" reaction time (RT) and psychophysical methods with reference to their applications in current neuro-cognitive psychology research. The course is designed to demonstrate the power of purely "psychological" tools for investigating internal (mental) states and processes.

Course contents

Week 1-7: Theoretical part: RT methods & Psychophysical methods
Week 8: Presentation and assignment of practical research projects
Weeks 9-13: Practical research work with Tutors
Week 14-15: Student's conference

Lecturers

PD Dr. Dragan Rangelov
PD Dr. Zhuanghua Shi

Tutors

M.Sc. Leonardo Assumpcao (group 1)
M.Sc. Efsun Annac (group 1)
PD Dr. Markus Conci (group 2)

Timetable

Lecture: Mo 14:00-16:00, Leopoldstr. 13, room 1208
Tutorial group 1: Tue 14:00-16:00, Leopoldstr. 13, room 1202
Tutorial group 2: Wed 14:00-16:00, Leopoldstr, 13, room 1206

Requirements for course credit points

Active participation in all components of the course (theoretical and practical)
Practicals: written report of laboratory project, and identifiable contribution to student's conference

Reading list

Gescheider, G.A. (1997). Psychophysics: The fundamentals (3rd). Hillsdale, New Jersey: Lawrence Erlbaum Associates.
Wickens, T. D. (2002). Elementary Signal Detection Theory. Oxford: OxfordUniversity Press.
Meyer, D.E., Osman, AM, Irwin, D.E., &Yantis, S. (1988). Modern mental chronometry. BiolPsychol, 26, 3-67.

Course D: Neuro-cognitive methods 1: EEG and ERP methodology (module 5) – first semester

Course aims

- Introduction to neurophysiological and technical principles of EEG
- Understanding ERPs and time-frequency analysis
- Reading papers and understanding paradigms using ERPs as dependent measure
- Acquiring practical skills in EEG recording and ERP analysis

Course contents

Weeks 1-6: Theoretical part (neurophysiological fundamentals, technical basics of EEG recording, selected ERPs, introduction to time-frequency analysis)
Weeks 7-10: Practical part I (data acquisition)
Weeks 11-15: Practical part II (data analysis using Brain Vision Analyzer / SPSS and preparation of report)

Lecturers

PD Dr. Thomas Töllner

Tutors

PD Dr. Thomas Töllner (group 1)
PD Dr. Agnieszka Wykowska (group 2)

Timetable

Lecture: Thu 16:00-18:00, Leopoldstr. 13, room 1202
Tutorial group 1: Mon 12:00-14:00, Leopoldstr. 44, room 511 (first tutorial session: 19th Oct)
Tutorial group 2: Wed 16:00-18:00, Leopoldstr. 44, room 511 (first tutorial session: 21st Oct)

Requirements for course credit points

- Test (middle of the semester; date tba)
- Oral paper presentation in tutorial (as well as regular reading of the relevant literature and active participation in class)
- Written ERP report (deadline: 20th Feb)

Reading list

Luck, S., Woodman, G., & Vogel, E. (2000). Event-related potential studies of attention. Trends Cogn Sci, 4, 432-440.

Luck, S. J. (2005). An Introduction to the Event-Related Potential Technique. Cambridge, MA: MIT Press.

Course L: Clinical neuro-cognitive research / Transcranial Magnetic Stimulation (module 12) – third semester

Course aims

Theoretical introduction and practical training in Transcranial Magnetic Stimulation (TMS) and its use in cognitive neuroscience.

Course contents

Introduction to TMS, including

- TMS physics, physiology and safety.
- Theoretical basis of TMS as an interference method
- TMS in cognitive neuroscience
- TMS and imaging
- Clinical uses of TMS

Hands-on training including

- MRI Guided Neuronavigation (using 'Brainsight' equipment)
- Stimulation of the Motor System to produce movements
- Stimulation of the Visual System to produce percepts

Lecturer

Prof. Dr. Paul Taylor

Tutor

Prof. Dr. Paul Taylor and lab members

Timetable

Lecture: Thu: 10:00-12:00 Leopoldstr. 13, room: 1407
Tutorial: Thu: 10:00-14:00 Leopoldstr. 13, room 3121. These are practical slots organized once the course has started: each student does at least one practical slot.

Requirements for course credit points

Active participation in lectures and practical classes.
Written report.

Reading list

Walsh, V., Cowey, A. (2000). Transcranial magnetic stimulation and cognitive neuroscience. Nature Reviews Neuroscience 1, 73-79. Additional reading will be provided during the course.

Course K: Basic neuro-cognitive research (module 13) – third semester

Foreword

Course K and M consists of two distinct options (A and B), out of which one has to be selected, following an introduction of the themes in the first semester week.

Option K(A). Visual object representations in attention and memory

Course description and topics

This course investigates how the structure of objects can affect the deployment of attention and (working) memory. In an introductory part, an overview of relevant studies will be provided by means of lecture sessions and paper presentations. In a second, experimental part of the course, a set of experiments will be jointly developed and realized with the aim to investigate how object representations influence what is attended and/or what is subsequently memorized. Students will be able to acquire theoretical knowledge as well as experimental expertise on visual working memory and visual attention.

Lecturers

PD Dr. Markus Conci
M.Sc. Qi-Yang Nie

Timetable

Thu 14:00- 18:00 Leopoldstr. 44, NCP meeting room 501. Option K(A) and K(B) will be introduced on Oct 22nd in NCP meeting room 501 (Leopoldstr. 44). **Note**: no class on Oct 15th.

Requirements for course credit points

- Active participation in class and (short) paper presentations
- Contribution to practical class components (e.g., data collection and analysis).
- Research report

Reading list

Brady, T. F., Konkle, T., & Alvarez, G. A. (2011). A review of visual memory capacity: Beyond individual items and toward structured representations. Journal of Vision, 11(5):4, 1–34.
Luck, S. J., & Vogel, E. K. (2013). Visual working memory capacity: from psychophysics and neurobiology to individual differences. Trends in Cognitive Science, 17, 391-400.
Ma, W. J., Husain, M., & Bays, P. M. (2014). Changing concepts of working memory. Nature Neuroscience, 17, 347-56.
Additional literature will be provided during the course.

Option K(B). Eye tracking as a tool to examine the development of social understanding

Course aims

Theoretical and practical introduction into eye tracking as a tool to bridge the gap between behavioral and neuroscientific methods in social cognition. Based on current literature on the development of social cognition from infancy till adulthood own experiments will be developed.

Course contents

- Theoretical overview on the recent state of the art concerning the development of action understanding.
- Introduction into eye-tracking.
- Designing an experiment based on current literature.
- Practical training in data collection, analyses and interpretation.
- Reporting results.

Lecturers

Prof. Dr. Markus Paulus

Timetable

Thu 14:00-18:00; Leopoldstr. 13, room 2201. Option K(A) and K(B) will be introduced on Oct 22nd in NCP meeting room 501 (Leopoldstr. 44). **Note**: no class on Oct 15th.

Requirements for course credit points

- Active participation in class
- Presentations
- Active participation in data collection and analysis
- Research report or poster presentation

Introductory Reading

Falck-Ytter, T., Gredebäck, G., & von Hofsten, C. (2006). Infants predict other people's action goals. *Nature Neuroscience, 9*, 878–879.
Paulus, M., Hunnius, S., van Wijngaard, C., Vrins, S., van Rooij, I., & Bekkering, H. (2011). The role of frequency information and teleological reasoning in infants' and adults' action prediction. *Developmental Psychology, 47*, 976-983.

Additional literature will also be provided during the course.

Course M. Applied neuro-cognitive research (module 14) – third semester

Option M(A): Aging, attention and memory

Course description and topics

Aging is assumed to be accompanied by reduced efficiency in top-down control processing. For example, in dual tasking situations, aging persons are known to show more severe performance decline, compared to a single task condition, than young persons. Such deficits seem to be even exaggerated in persons with high risk for developing Alzheimer's disease, such as patients with mild cognitive impairment (MCI).
During this course we want to assess whether, in aging persons, enhanced dual tasking effects can be found on memory performance. If respective volunteers are available we will also assess single cases with MCI (but this cannot be taken for granted). We want to specify whether especially those memory functions suffer that are assumed to rely on top-down control.
In an introductory part, an overview of relevant studies will be provided by means of lecture sessions and paper presentations. In the following experimental part of the course, students will actively participate in the study (e.g., subject recruitment, data collection and analysis). The assessment of memory functions will rely on a newly established paradigm that is assumed to differentiate between automatic and controlled memory retrieval.

Lecturers

PD Dr. Kathrin Finke, M.Sc. Julia Neitzel

Timetable

Tue: 8:00 -12:00; Leopoldstraße 44, NCP Meeting room 501

Requirements for course credit points

Active participation in class including group work and (short) presentations
Realization of experiment with young and elderly participants
Research report

Reading list

Cabeza, R., Ciaramelli, E., Olson, I. R., & Moscovitch, M. (2008). The parietal cortex and episodic memory: an attentional account. *Nature Reviews Neuroscience*, *9*(8), 613-625.

Option M(B). Neuroimaging in Psychosis and At Risk Mental State

Course description and topics

This course will enable student to engage in understanding structural and functional brain changes in psychiatric disorders, especially in psychosis and prodromal stage of psychosis (at risk mental state). An integrative approach in prediction and staging of psychosis consisting of brain imaging, neuropsychological and clinical routine will be introduced to students. In the first part of the course students will be strongly encouraged to discuss "real" clinical cases and gain basic knowledge in the field of neuroimaging in psychosis. In the second part of the course students will join the data acquisition which already takes place within the framework of EU funded project PRONIA, which is aiming at facilitating the targeted prevention of psychoses. Furthermore, multi-center project PRONIA is working on optimizing candidate biomarkers for the prediction and staging of psychoses and generating a prognostic system that generalizes well across mental health services. This course will try to complement course N in it's second part- students will analyze resting-state data in practical sessions using various Matlab toolboxes. At the end of the course students should be able to use a novel platform of modern psychiatry which provides a deeper understanding of clinical and cognitive features of psychosis and how they relate to brain changes in different stages of illness.

Lecturer

Dr. Lana Kambeitz-Ilankovic, PD Dr. Nikolaos Koutsouleris, M.Sc. Maria Urquijo Castro, M.Sc. Shalaila Haas

Timetable

Mon 15:00-19:00, Nußbaumstr. 7, Alzheimer Saal 3rd Floor (Old Building); Further, there will be subtle changes to the course schedule the data acquisition phase when smaller groups of students will be formed. All the time slots will always be discussed with students and participants and we will try to find an optimal solution for every student.

Requirements for course credit points

Active participation in class and paper presentations
Contribution to practical class components (e.g., data collection and analysis).
Research report/ poster

Reading list

Yung, A., Phillips L. , Yuen, H. & McGorry,P. (2004). Risk factors for psychosis in an ultra high-risk group: psychopathology and clinical features. Schizophrenia Research, 67(2-3), 131-42.
Koutsouleris N., Meisenzahl E., et al. (2009). Use of neuroanatomical pattern classification to identify subjects in at-risk mental states of psychosis and predict disease transition. Archives of General Psychiatry, 66(7),700-12
Falkenberg, I., Kircher, T., & Krug, A. (2014). Neuroimaging in Schizophrenia. In MRI in Psychiatry (pp. 249-274). Springer Berlin Heidelberg.
Additional literature for the presentations will be provided during the course.

Course N: Neuro-cognitive methods 3: Functional magnetic resonance imaging (module 16) – third semester

Course description and topics

This course will give students an introduction to the methods of magnetic resonance imaging and the types of neuroscientific questions that can be addressed with this method. In the first half of the course we will cover the physics behind the magnetic resonance imaging, the basis of the blood-oxygen-level-dependent signal, and considerations when designing functional magnetic resonance imaging (fMRI) experiments. In the second half of the course we will analyze a classical fMRI experiment in practical sessions using the Matlab toolbox SPM8 (http://www.fil.ion.ucl.ac.uk/spm/). If time allows we will also look at the additional information that can be acquired in structural imaging, including voxel-based morphometry (VBM) and diffusion tensor imaging (DTI) as well as advanced data analysis techniques.

Lecturer

Dr. Virginia L. Flanagin

Timetable

Lecture: Tue 14:00 – 16:00; Leopoldstr. 13a, room F11 PC Room
Tutorial: Tue 16:00 – 18:00; Leopoldstr. 13a, room F11 PC Room

Requirements for course credit points

Active participation in class including discussions and a completed data analysis practical.
Final exam (exact date to be announced in the course)

Reading list

This is a list of suggested reading and is not required before participating in the course.

Friston, K. (2003) Introduction to Statistical Parametric Mapping. In: Human Brain Function, Eds: Frackowiak RSJ, Friston K & Frith C. Elsevier LTD, Oxford, 2nd Ed.
Friston KJ. (2009) Modalities, modes, and models in functional neuroimaging. Science; 326(5951): 399-403.
Kriegeskorte N, Simmons WK, Bellgowan PSF & Baker CI. (2009) Circular analysis in systems neuroscience – the dangers of double dipping. Nature Neuroscience; 12(5): 535–540.
Lindquist MA. (2008) The Statistical Analysis of fMRI Data. Statistical Science; 23(4): 439–464.
SPM8 manual: http://www.fil.ion.ucl.ac.uk/spm/doc/manual.pdf
Additional reading sources will be provided during the course.

Course Z: Scientific debating club seminar 2 (module 10) – third semester

Course aims

The aim of this course is to read and critically evaluate ("review") recent published research articles in the field of neurocognitive psychology. We will discuss the articles in terms of: the issue under investigation, the conceptual developmental, the methodology used to investigate it, the data analysis and presentation, and the discussion of the results and their theoretical implications.

Course contents

Topics will be provided in the first session (Oct 14th, 14:00-16:00, Leopoldstr. 13, room 1407).

Lecturers

PD Dr. Thomas Geyer (group 1)
Prof. Dr. Simone Schütz-Bosbach (group 2)

Timetable

Group 1: Wed. 14:00 – 16:00, Leopoldstr. 13, room 1407
Group 2: Wed. 14:00 – 16:00, Leopoldstr. 13, room 1202

Requirements for course credit points

- Each student has to present an article (the presenter is the main proponent of the work and presents and defends the paper convincingly as if it was his/her own work).
- Each student has to criticize an article as tough as possible (play the "devil's advocate" and bring up 5-10 critical issues that limit the value of the study).
- All students are required to read all articles and to actively participate in the discussions in each session.

Reading list

Journal articles will be provided in the first session (Oct 14th).

Course Y: Colloquium (modules 2, 15) – first and third semester

Course aims

The aim of the colloquium is to (learn to) listen to and discuss other scientists' presentations of their latest, frequently as yet unpublished, research within the field of neuro-cognitive psychology. Invited national and international guest speakers will talk about and discuss their latest findings and theories. The colloquium is traditionally followed by a 'post-colloquium' in a restaurant where the discussion can be continued in an informal atmosphere. All attendees of the colloquium are invited to join the post-colloquium.

Lecturers

Invited guest speaks
Organizer: Prof. Dr. Hermann Müller

Timetable

Wed. 18:00-20:00, Leopoldstr. 13, room 2401

Requirements for course credit points

Regular participation (documented by attendance lists)
A written report of 3 to 5 pages on one colloquium talk with reference to the issue under investigation, the methodology used, the conclusions that were drawn etc. (due date: 16th Feb).

Program

Week	Date	Speaker	Title	Host
1	14/10	NCP welcome reception		
2	21/10	Cees van Leeuwen *U o Leuven, B*	What is it like, for the brain to be a dynamical system	MC
3	28/10	Sebo Uithol *Universita di Parma, I*	On the causal origins of intentional action	MP
4	4/11	Pascal Mamassian *École des Neurosc., Paris, F*	Uncertainty and confidence in cross-modal perception	ZS
5	11/11	Uta Noppeney *U o Birmingham, UK*	See what you hear – Constructing a representation of the world across the senses	ZS
6	18/11	Pieter Medendorp *U o Nijmegen, NL*	Reference frames in visual stability and action selection	HD
7	25/11	Simone Schütz-Bosbach *LMU München, D*	Tba	HM
8	2/12	Stefan van der Stigchel *U o Utrecht, NL*	Attentional allocation before and after saccades	HD
9	9/12	Daniel Smith *U o Durham, UK*	Attention within and beyond the range of eye-movements	TS
10	16/12	Paul Bays *U o Cambridge, GB*	Precision and binding in visual working memory	Jet
11	23/12	No seminar	————	
12	13/01	Melissa Vo *U o Frankfurt, D*	Reading scenes: How scene grammar guides attention and perception in real-world environments	TG
13	20/01	Andrea Kiesel *U o Freiburg, D*	It is not only words - exploring instructed stimulus-response associations	TT
14	27/01	No seminar	————	
15	3/02	Markus Siegel *U o Tübingen, D*	Spectral fingerprints of neuronal interactions	PS