UNIVERSITÄT ZU LÜBECK

Module Guide for the Study Path

Master Psychology - Cognitive Systems 2022

1st or 2nd semester

1st or 3rd semester

1st semester

2nd or 4th semester

2nd semester

2nd semester at the earliest

3rd semester

4th semester

Arbitrary semester

PY4522-KP04 - Concepts in Positive Psychology Positive Organizational Psychology (PosPsy)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 1st or 2nd semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), psychology, 1st or 2nd semester

Classes and lectures:

- PY3204-KP04 Concepts of Positive Psychology (seminar, 2 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Concepts, theories, and methods of positive psychology will be discussed.
- Among the concepts covered are psychological capital, flow experience, social support/positive relationships, well-being, gratitude, meaning, humor, character strengths, mindfulness, and more.
- Methods covered include happiness diary, gratitude letter, mindfulness training and more.
- Methods covered include happiness diary, gratitude letter, mindfulness training and more.
- Relevant studies and findings are being critically discussed regarding content and methods.

Qualification-goals/Competencies:

- Students gain in-depth insights into a wide range of positive-psychological theories, concepts and methods.
- They discuss and reflect on studies and findings of positive psychology.

Grading through:

- written homework

Responsible for this module:

- Prof. Dr. Corinna Peifer

Teacher:

- Department of Psychology

- Prof. Dr. Corinna Peifer

Literature:

- Lopez, S. J. & Snyder, C.R. (2011): The Oxford Handbook of Positive Psychology. - Oxford: Oxford University Press.

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Presentation, scope and duration will be announced at the beginning of the semester.

Module examination(s):
- PY4522-L1: Concepts of positive psychology, term paper, 100% of the module grade

AT4110-KP06 - Auditory Cognition (AudCog)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	6

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 1st or 3rd semester
- Master Auditory Technology 2022 (compulsory), Auditory Technology, 1st semester
- Master Psychology 2016 (optional subject), psychology, 1st or 3rd semester
- Master Auditory Technology 2017 (compulsory), Auditory Technology, 1st semester

Classes and lectures:

- Basics in neurocognition of speech and hearing (lecture, 2 SWS)
- Advances in auditory cognition and auditory neurophysiology (seminar, 2 SWS)

Workload:

- 100 Hours private studies
- 60 Hours in-classroom work
- 20 Hours exam preparation

Contents of teaching:

- Basics of neuroanatomy
- Basic concepts of sensory physiology and perception
- Hearing, listening, and language comprehension as neural processes
- A neuropsychological view on language disorders across the life span (specific language impairment, aphasia)
- Basics of neural plasticity (with a focus on hearing loss, deafness, and cochlear implants)
- Basics of computational neuroscience

Qualification-goals/Competencies:

- Students develop the knowledge required to foster a more profound understanding on auditory cognitive processes, and on how they relate to physiology, perception, neuropsychology, and neuroscience.
- Students can actively use this knowledge, relate it to current topics in the literature, and transfer it onto new problems.

Grading through:

- written homework

Responsible for this module:

- Prof. Dr. rer. nat. Jonas Obleser

Teacher:

- Department of Neurology
- Department of Psychology

- Prof. Dr. rer. nat. Jonas Obleser
- Prof. Dr. rer. nat. Marcus Heldmann

Literature:

- Poeppel, D., Overath, T., Popper, A.N. & Fay, R.R.: The Human Auditory Cortex - (Springer Handbook of Auditory Research; Vol. 43). New York, NY: Springer. DOI: 10.1007/978-1-4614-2314-0

Language:

- German and English skills required

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Active contribution
- Ungraded presentation

Module examination(s):
- AT4110-L1: Auditory Cognition, term paper, 100% of the module grade

(proportion of Institute of Psychology I to V is 60%)
(proportion of Institute of Psychology I to S is 60%)
(Proportion of Clinic for Neurology in V is 40%)
(Proportion of Clinic for Neurology to S is 40%)

Also as an elective subject for psychology students an A certificate (graded)

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PY4521-KP04 - Positive Organizational Psychology (POP)		
Duration:	**Turnus of offer:**	**Credit points:**
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 1st or 3rd semester
- Master Psychology 2016 (optional subject), psychology, 1st or 3rd semester

Classes and lectures:

- PY3204-KP04 Positive Organizational Psychology (seminar / exercises, 2 SWS)

Workload:

- 80 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Topics of positive organizational psychology, such as psychological capital, flow experience, social support/positive relationships, well-being, gratitude, meaning, humor, character strengths...
- Methods of positive organizational psychology (e.g. happiness diary, letter of gratitude, mindfulness training...)
- Exercise of selected positive-psychological interventions for the organizational context
- Design of target group specific interventions (e.g. as training, coaching, app, ...)
- Evaluation of interventions in organizations
- Due to the interactive design of the seminar and the practical work in small groups, attendance of 80% is compulsory in this module. As the seminar is offered in block dates, all dates must be attended in order to pass the module. This means that you will not be able to skip any of the dates completely. There are no substitutions.

Qualification-goals/Competencies:

- Getting to know a wide range of positive-psychological topics and methods
- Acquisition of skills to design demand-oriented interventions in organizations
- Experience with the execution of positive-psychological interventions
- Knowledge in the evaluation of interventions in an organisational context

Grading through:

- presentation
- B-Certificate (not graded)

Responsible for this module:

- Prof. Dr. Corinna Peifer

Teacher:

- Department of Psychology

- Prof. Dr. Corinna Peifer

Literature:

- Rose, N. (2019): Arbeit besser machen - Freiburg: Haufe
- Tomoff, M. (2018): Positive Psychologie in Unternehmen: Für Führungskräfte (2. Aufl.) - Berlin: Springer

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Compulsory attendance of 80%, all block dates must be attended.
Exam:
- PY4521-L1: Positive Psychology in Organizational Context, presentation, 100% of module grade

PY4101-KP08 - Advanced (statistical) methods of analysis of multivariate data (Stats3Psy)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	8

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 1st semester

Classes and lectures:

- PY4101-V: Statistik 3 - Vorlesung (lecture, 2 SWS)
- PY4101-S: Statistik 3 (seminar, 2 SWS)
- PY4101-Ü: Statistik 3 (exercise, 1 SWS)

Workload:

- 140 Hours private studies and exercises
- 70 Hours in-classroom work
- 30 Hours exam preparation

Contents of teaching:

- Generalised linear models (e.g., logistic regression)
- Applied multivariate statistics (Confounding, Moderation, Mediation, Causality, Bias)
- Basics in Classification, Pattern recognition, Dimensionality reduction
- Basics in statistical epidemiology and risk communication
- Algebra and geometry of linear models
- Generalized linear models (e.g. logistic regression) and hierarchical linear models

Qualification-goals/Competencies:

- Students acquire a more profound ability in planning, analysing, assessing and interpreting scientific results.
- Students are able to analyse complex data sets from behavioural and neuroscience with current statistical software and in doing so are able to follow exploratory and confirmatory approaches.
- Enhanced skills in mathematical, methodological, and analytical thinking
- A deeper understanding in terms of linear algebra and geometry of the linear model
- Extended skill set of solving statistical problems and reaching evidence-based decisions
- Teaching the practical application of exploratory and confirmatory analysis strategies; including ensuring the reproducibility of results (through the use of R notebooks)

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. rer. nat. Jonas Obleser
- PD Dr. phil. Sarah Tune

Teacher:

- Department of Psychology

- Prof. Dr. rer. nat. Jonas Obleser

Literature:

- Fox, J. (2015): Applied Regression Analysis and Generalized Linear Models. - SAGE Publications
- Westreich, D. (2019): Epidemiology by Design. - Oxford University Press, USA
- Tabachnick, B., Fidell, L.S. (2013): Using Multivariate Statistics: - Pearson New International Edition. Pearson Higher Ed.
- Wickens, T. (1995): The Geometry of Multivariate Statistics - Psychology Press.

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Submission of exercise sheets; active participation

Module examination(s):
- PY4101-L1: Advanced (statistical) methods of analyzing multivariate data, written exam, 90min, 100% of the module grade

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PY4210-KP07 - Engineering Psychology - CS (IngPsyCS)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	7

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 1st semester
- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 1st semester

Classes and lectures:

- PY4210-KP07-V: Engineering Psychology (lecture, 2 SWS)
- PY4210-KP07-S: Traffic Psychology (seminar, 2 SWS)

Workload:

- 150 Hours private studies and exercises
- 60 Hours in-classroom work

Contents of teaching:

- Fundamentals of engineering psychology & human-machine systems
- Automation & Artificial Intelligence
- Attention & Perception
- Situation Awareness & Mental Modells
- Workload & Stress
- Decide & act
- Multitasking und Ressourcenmanagement
- Seminar: Fundamentals of Traffic Psychology
- Mobility
- Traffic and Age
- Behaviour Control in Road Traffic
- Motor traffic, diseases and fitness to drive
- Traffic Education

Qualification-goals/Competencies:

- Lecture:
- Students can receive, classify and use engineering psychological research contributions.Students can explain central theories and findings of engineering psychology with reference to relevant questions of human-technology interaction and interface conception.Students can derive design guidelines for human-machine systems from engineering psychological concepts and findings.
- Seminar:
- Students acquire knowledge of the psychological components involved in different areas of mobility.
- Students are able to apply fundamental psychological knowledge to the interdisciplinary context of traffic.
- Students are able to reflect in critical discussion between theory, empirical research and practice in the field of traffic psychology.

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. rer. nat. Thomas Franke

Teacher:

- Department of Neurology
- Institute for Multimedia and Interactive Systems

- Prof. Dr. rer. nat. Thomas Franke
- Dr. rer. hum. biol. Andreas Sprenger

Literature:

- Wickens, C., Helton, W. S., Hollands, J., Banbury, S. (2021: Engineering psychology and human performance. - New York: Routledge
- Proctor, R., & van Zandt, T. (2018): Human Factors in Simple and Complex Systems - Boca Raton: CRC Press.
- Salvendy, G. (2021): Handbook of Human Factors and Ergonomics - New York: Wiley

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Written elaboration or presentation

Module examination(s):
- PY4210-L1: Engineering Psychology, written exam, 90min, 100% of the module grade

(share of Institute for Multimedia and Interactive Systems in V is 100%)
(Proportion of neurology in S is 100%)

PY4220-KP06 - Computational Psychology (CompPsyc)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	6

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 1st semester

Classes and lectures:

- PY4240-KP06-V: Computational Psychology Vorlesung (lecture, 2 SWS)
- PY4240-KP06-S: Computational Psychology Seminar (seminar, 2 SWS)

Workload:

- 120 Hours private studies
- 60 Hours in-classroom work

Contents of teaching:

- Understanding computer-based models in psychology
- Apply Bayesian models and predictive coding
- Theories and models for decision-making
- Researching computer-aided psychiatry and mental disorders
- Use of machine learning and big data in psychology
- Critical evaluation of explanation and prediction in psychological research

Qualification-goals/Competencies:

- Basic understanding of computational models and their role in explaining cognitive and neural processes
- Application of Bayesian models and predictive coding to explain perception, cognition and psychiatric disorders
- Understanding how computational models help to understand, diagnose and potentially treat psychiatric disorders such as schizophrenia, depression and addiction
- Applying machine learning techniques and large-scale data analysis to cognitive psychology and behavior prediction
- Understanding explanatory versus predictive modeling in psychology

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. rer. nat. Jonas Obleser

Teacher:

- Department of Psychology

- Prof. Dr. rer. nat. Jonas Obleser
- Dr. Niels Kloosterman

Language:

- German and English skills required

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Successful completion of homework assignments during the semester.

Exam:
- PY4220-L1: Computational Psychology, Klausur, 90min, 100% der Modulnote

PY4240-KP07 - Cognitive and Affective Neuroscience (KogAfNeuro)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	7

Course of study, specific field and term:
- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 1st semester
- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 1st semester

Classes and lectures:
- PY4240-V Kognitive und affektive Neurowissenschaften (lecture, 2 SWS)
- PY4240-S Kognitive und affektive Neurowissenschaften (seminar, 2 SWS)

Workload:
- 120 Hours private studies
- 60 Hours in-classroom work

Contents of teaching:
- Current theories, methods and debates in cognitive and affective neuroscience
- Focus on decision neuroscience, affective neuroscience and social neuroscience
- Naturalistic paradigms in cognitive and social neuroscience and their data analysis methods
- Design of neuroscientific studies on decision-making, affect and social behavior

Qualification-goals/Competencies:
- Students can explain and apply in-depth knowledge in decision neuroscience, affective and social neuroscience
- Students can apply their knowledge to design neuroscientific studies on decision-making, emotions and social behavior
- Students know naturalistisc paradigms and methods to study cognition, perception and social interaction and can critically reflect upon them.
- Students can present their knowledge and critically discuss their opinions.

Grading through:
- portfolio exam

Responsible for this module:
- Prof. Dr. rer. nat. Ulrike Krämer

Teacher:
- Institute of Medical Psychology

- Prof. Dr. rer. nat. Ulrike Krämer

Literature:
- Will be announced in the course.:

Language:
- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- None

Module examination(s):
PY4240-L1: Portfolio examination Cognitive and affective neuroscience with a total of 100 points, divided as follows:
- 60 points for a written exam (90min)
- 40 points for the completion of seminar tasks

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PY4860-KP04, PY4860 - Hands on EEG data (EEGdata)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	every summer semester	4	10

Course of study, specific field and term:
- Master Auditory Technology 2022 (optional subject), psychology, 2nd semester
- Master psychology 2013 (optional subject), psychology, 2nd or 4th semester
- Master Psychology 2016 (optional subject), psychology, 2nd or 4th semester
- Master Auditory Technology 2017 (optional subject), psychology, 2nd semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 2nd or 4th semester
- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester

Classes and lectures:
- Seminar Hands on EEG data (seminar, 2 SWS)

Workload:
- 65 Hours private studies and exercises
- 30 Hours written report
- 25 Hours in-classroom work

Contents of teaching:
- Theoretical and practical knowledge to analyze EEG-data
- Introduction into EEG-signals: neural activity, signal generation, evoked potentials, oscillations
- Preprocessing: filtering, epoching, ICA, re-referencing, ERPs, time-frequency analysis
- Statistical Parametric Mapping (SPM)
- EEGlab

Qualification-goals/Competencies:
- Theoretical knowledge about EEG and data analysis
- Ability to analyze EEG data using SPM 8 and EEGlab in combination with Matlab
- Ability to create an SPM-based and ability to interpret the results of an EEG study and summarize in a scientific text

Grading through:
- Written report
- B-Certificate (not graded)

Responsible for this module:
- Prof. Dr. rer. nat. Nico Bunzeck

Teacher:
- Department of Psychology

- Dr. rer. biol.hum. Tineke Steiger

Literature:
- Present literature will be given in the course:

Language:
- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- None

Modul exam:
- PY4860 Hands on EEG data, report, 100% of module grade

PY4230-KP06 - Computational Neurosciences (CompNeuro)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	6

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 2nd semester

Classes and lectures:

- CS4405-V: Neuroinformatik (lecture, 2 SWS)
- CS4230-S: Computational Neurosciences (seminar / exercises, 2 SWS)

Workload:

- 90 Hours private studies
- 60 Hours in-classroom work
- 30 Hours exam preparation

Contents of teaching:

- The human brain and abstract neuron models
- Learning with a single neuron:* Perceptrons* Max-Margin Classification* LDA and logistic Regression
- Network architectures:* Hopfield-Networks* Multilayer-Perceptrons* Deep Learning
- Recurrent networks (LSTM, GPU)
- Unxupervised Learning:* k-means, Neural Gas and SOMs* PCA & ICA* Sparse Coding

Qualification-goals/Competencies:

- The students are able to understand the principle function of a single neuron and the brain as a whole.
- They know abstract neuronal models and they are able to name practical applications for the different variants.
- They are able to derive a learning rule from a given error function.
- They are able to apply (and implement) the proposed learning rules and approaches to solve unknown practical problems.

Grading through:

- written exam

Responsible for this module:

- Prof. Dr. rer. nat. Thomas Martinetz

Teacher:

- Institute for Neuro- and Bioinformatics

- Prof. Dr. rer. nat. Thomas Martinetz
- N.N.

Literature:

- S. Haykin: Neural Networks - London: Prentice Hall, 1999
- J. Hertz, A. Krogh, R. Palmer: Introduction to the Theory of Neural Computation - Addison Wesley, 1991
- T. Kohonen: Self-Organizing Maps - Berlin: Springer, 1995
- H. Ritter, T. Martinetz, K. Schulten: Neuronale Netze: Eine Einführung in die Neuroinformatik selbstorganisierender Netzwerke - Bonn: Addison Wesley, 1991
- Ian Goodfellow, Yoshua Bengio, Aaron Courville: Deep Learning - MIT Press 2016

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Successful completion of practice assignments during the semester.

The module includes as the only examination a written exam with duration and scope according to PVO §12.

PY4520-KP07 - Industrial and Organizational Psychology - Work 4.0 (AO)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	7

Course of study, specific field and term:
- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 2nd semester
- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 2nd semester

Classes and lectures:
- PY4520-V: Work 4.0 Vorlesung (lecture, 2 SWS)
- PY4520-V: Work 4.0 Seminar (seminar, 2 SWS)

Workload:
- 150 Hours private studies
- 60 Hours in-classroom work

Contents of teaching:
- Topics are current challenges and trends in work and organizational psychology, often summarized under the title Work 4.0
- How is work changing? What are the consequences for performance, motivation and well-being? How is leadership changing? How can companies be prepared for the changes of work? Topics are in particular:
- Effects of globalisation and digitalisation: Modern stressors and their consequences
- New forms of collaboration: virtual collaboration, agility
- Automation and Artificial Intelligence
- HR Analytics in Recruitment, Talent Management, Retention Management and Engagement Monitoring
- Robotics

Qualification-goals/Competencies:
- Students know the central current theories, findings, methods and debates of work and organizational psychology.
- They will gain sound knowledge of the professional selection and application of modern work and organizational psychological methods.
- They will deepen and reflect on the contents by means of case studies in the seminar.
- They deal with current practical fields of application and challenges in the course of globalization, digitization and artificial intelligence.

Grading through:
- written exam and course achievements

Responsible for this module:
- Prof. Dr. Corinna Peifer

Teacher:
- Department of Psychology

- Prof. Dr. Corinna Peifer

Literature:
- Werther, S., & Bruckner, L. (2018): Arbeit 4.0 aktiv gestalten - Berlin: Springer

Language:
- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Paper (graded), scope and duration will be announced at the beginning of the semester.

Exam:
- PY4520-L1: Arbeits- und Organisationspsychologie - Arbeit 4.0, Klausur, 90 min, 70% der Modulnote, Referat 30% der Modulnote

PY4523-KP04 - Industrial and Organizational Psychology in practice (AOPraxi)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	4

Course of study, specific field and term:
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 2nd semester

Classes and lectures:	Workload:
• PY4520-V: Work 4.0 Vorlesung (seminar, 2 SWS)	• 90 Hours private studies • 30 Hours in-classroom work

Contents of teaching:
- Topics are current challenges and trends in work and organizational psychology, often summarized under the title Work 4.0
- How is work changing? What are the consequences for performance, motivation and well-being? How is leadership changing? How can companies be prepared for the changes of work? Topics are in particular:
- Effects of globalisation and digitalisation: Modern stressors and their consequences
- New forms of collaboration: virtual collaboration, agility
- Automation and Artificial Intelligence
- HR Analytics in Recruitment, Talent Management, Retention Management and Engagement Monitoring
- Robotics

Qualification-goals/Competencies:
- Students know the central current theories, findings, methods and debates of work and organizational psychology.
- They will gain sound knowledge of the professional selection and application of modern work and organizational psychological methods.
- They will deepen and reflect on the contents by means of case studies in the seminar.
- They deal with current practical fields of application and challenges in the course of globalization, digitization and artificial intelligence.

Grading through:
- written homework

Responsible for this module:
- Prof. Dr. Corinna Peifer

Teacher:
- Department of Psychology

- Prof. Dr. Corinna Peifer

Literature:
- Werther, S., & Bruckner, L. (2018): Arbeit 4.0 aktiv gestalten - Berlin: Springer

Language:
- offered only in German

Notes:
Prerequisites for attending the module:
- None

Prerequisites for the exam:
- Paper, scope and duration will be announced at the beginning of the semester.

The module includes as the only examination an essay as a term paper according to PVO §12.

PY4840-KP07 - Healthy and Pathological psychological Ageing (Altern)

Duration:	Turnus of offer:	Credit points:
1 Semester	each summer semester	7

Course of study, specific field and term:
- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 2nd semester
- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 2nd semester

Classes and lectures:
- Neuronale und psychologische Grundlagen des gesunden und pathologischen Alterns (Vorlesung) (lecture, 2 SWS)
- Neuronale und psychologische Grundlagen des gesunden und pathologischen Alterns (Seminar) (seminar, 2 SWS)

Workload:
- 150 Hours private studies
- 60 Hours in-classroom work

Contents of teaching:
- Neural and cognitive basics underlying healthy and pathological aging
- Current and advanced methods in aging research: research designs, experiments, imaging methods (e.g. EEG, fMRI)
- Neural and cognitive changes of healthy aging: neurodegeneration, plasticity, learning and memory
- Neural and cognitive changes of pathological aging: MCI, dementia, Parkinson s disease
- Applications: prevention, cognitive trainings, lifelong learning

Qualification-goals/Competencies:
- Students acquire knowledge on the neural and cognitive changes of healthy and pathological aging and can critically reflect upon it .
- They will be able to research original literature in order to present, assess and critically discuss it within a group.
- They learn to summarize independently acquired knowledge in a poster, a scientific text and a presentation.

Grading through:
- written exam

Responsible for this module:
- Prof. Dr. rer. nat. Nico Bunzeck

Teacher:
- Department of Psychology

- Prof. Dr. rer. nat. Nico Bunzeck

Literature:
- Current original literature will be announced at the event:

Language:
- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- 80% compulsory attendance
- Written exposé, poster and oral presentation of a hypothetical scientific paper

Exam:
- PY4840-L1: Healthy and pathological psychological ageing, Written exam, 6ß0 Minutes, 100% of the module grade

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PY4012-KP04 - Advanced Nonparametric Methods (NonparVer)		
Duration:	**Turnus of offer:**	**Credit points:**
1 Semester	each summer semester	4

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), psychology, 2nd semester at the earliest
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 2nd semester at the earliest
- Master Psychology - Clinical Psychology and Psychotherapy 2027 (optional subject), psychology, Arbitrary semester

Classes and lectures:

- Advanced Nonparametric Methods (seminar, 2 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Nonparametric methods as a computationally intensive but low-presumption alternative.
- Nonparametric estimation techniques: Jackknife, Bootstrap
- Nonparametric testing procedures: Permutation tests, randomization tests
- Develop and apply nonparametric test statistics yourself

Qualification-goals/Competencies:

- To learn and apply non-parametric methods, in the narrower as well as in the broader sense
- Independently find and apply non-parametric solutions to estimation and testing problems
- Searching and implementating of appropriate software solutions

Grading through:

- B-Certificate (not graded)

Requires:

- Advanced (statistical) methods of analysis of multivariate data (PY4101-KP05)
- Advanced (statistical) methods of analysis of multivariate data (PY4101-KP08)

Responsible for this module:

- Prof. Dr. rer. nat. Jonas Obleser

Teacher:

- Department of Psychology

- Prof. Dr. rer. nat. Jonas Obleser

Literature:

- :

Language:

- Will be offered using an audience-oriented mixture of German and English

Notes:

Admission requirements for taking the module:
- Statistics 3 (Advanced Methodology 1) must have been completed.

Admission requirements for participation in module examination(s):
Successful completion requires
- regular attendance,
- active participation (peer-instructions, presentations)

Module examination(s):
- PY4012-L1: Advanced Nonparametric Methods, submission of two written and self-programmed

PY4610-KP04 - Science Communication (SciComm)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	every summer semester	4	24

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2027 (optional subject), psychology, 2nd semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), psychology, 2nd semester at the earliest
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, 2nd semester at the earliest

Classes and lectures:

- PY4610-S Scientific Communication (seminar, 2 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Critical evaluation of scientific results and reports
- Illumination of methodological problems and recent answers to these problems in psychology.
- How to recognize and avoid academic misconduct and plagiarism
- Scientific writing
- Focus: Open Science

Qualification-goals/Competencies:

- Toward the end of their studies, students critically examine science and science communication in their discipline.
- Students learn to structure valid arguments and to discuss results critically
- Students learn to differentiate between scientific expert and lay communication
- Students learn standards and techniques for presenting scientific results

Grading through:

- assignment in seminar (presentation, paper, etc.), not-graded
- Written report
- B-Certificate (not graded)

Responsible for this module:

- Prof. Dr. rer. nat. Jonas Obleser

Teacher:

- Department of Psychology

- PD Dr. rer. nat. Malte Wöstmann

Literature:

- Könneker, C.: Wissenschaft Kommunizieren - Heidelberg: Verlag Spektrum der Wissenschaft, 2012
- Weber-Wulff, D.: False Feathers - Heidelberg: Springer, 2024

Language:

- Will be offered using an audience-oriented mixture of German and English

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Assumption of a seminar performance (interview with experts, presentation, thesis paper, etc.), ungraded
- Written & technical elaboration (e.g. script & audio file of an interview with an expert)

Module Exam(s):
- PY4610-L1: Science communication, seminar paper, 100% of the module grade

PS5000-KP06, PS5000 - Student Conference (ST)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	6 (Typ B)

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 3rd semester
- Master Biophysics 2023 (compulsory), biophysics, 3rd semester
- Master Auditory Technology 2022 (compulsory), Auditory Technology, 3rd semester
- Master MES 2020 (compulsory), interdisciplinary competence, 3rd semester
- Master Medical Informatics 2019 (compulsory), interdisciplinary competence, 3rd semester
- Master Biophysics 2019 (compulsory), biophysics, 3rd semester
- Master Auditory Technology 2017 (compulsory), Auditory Technology, 3rd semester
- Master Interdisciplinary Courses (optional subject), Interdisciplinary modules, Arbitrary semester
- Master Robotics and Autonomous Systems 2019 (compulsory), Compulsory courses, 3rd semester
- Master Medical Informatics 2014 (compulsory), interdisciplinary competence, 3rd semester
- Master MES 2014 (compulsory), interdisciplinary competence, 3rd semester
- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 3rd semester

Classes and lectures:

- Student Conference (seminar, 4 SWS)

Workload:

- 155 Hours work on an individual topic (research and development) and written elaboration
- 25 Hours in-classroom work

Contents of teaching:

- Preparation of a scientific publication in English based on the results of at least one of the project internships
- Preparation of a scientific poster in English based on the results of at least one of the project internships
- Presentation of a scientific poster in German or English, based on the results of at least one of the project internships
- Talk in English based on the results of at least one of the project internships
- Active participation in scientific discussions
- Active participation in a scientific peer-review process

Qualification-goals/Competencies:

- Students have experience in a comprehensive review of a scientific topic
- They are able to get an extensive overview of a complex scientific area
- They have the experience and ability to take an active part in scientific discussions
- They are able to defend one's work successfully in a scientific discourse
- They have knowledge of the peer-review process of publications
- They are able to constructively criticize in a blind peer-review process
-

Grading through:

- continuous, successful participation in course

Responsible for this module:

- Prof. Dr. rer. nat. habil. Heinz Handels
- Prof. Dr. rer. nat. Thorsten Buzug

Teacher:

- All Institutes and Clinics of the Universität zu Lübeck

Literature:

- is selected individually:

Language:

- offered only in English

Notes:

Admission requirements for the module:
- Successful completion of at least one project internship.
- Registration for at least one project internship is required.

Admission requirements for the examination:
- Regular and successful participation

Since the content of the presentation should reflect the results of at least one of the project internships, the students will be supervised by the same university lecturer that supervised the internships. Internships can be carried out at home or abroad in medical technology companies, audiology companies and IT companies in the healthcare industry as well as hospitals and scientific institutions. The supervision by an university lecturer is obligatory.

Students for whom this course is a compulsory module have priority.

(The share of the Institute of Medical Technology in all is 75%)
(Share of medical informatics in all is 25%)

PY4300-KP12 - Research Internship (ForschPra)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	12

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 3rd semester
- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 3rd semester

Classes and lectures:	**Workload:**
• PY4300-Ü Research Internship (exercise, 2 SWS) • PY4300-P Research Internship (practical course, 20 SWS)	• 360 Hours in-classroom work

Contents of teaching:

- Implementation of theoretical concepts of planning, conducting and analyzing an experiment
- Development of scientific research question and hypothesis
- Data collection and analysis according to own research question
- Writing of a research paper

Qualification-goals/Competencies:

- Sensitization for problems concerning planning, conducting, analysing and documentation of a research project
- Insights into disadvantages and advantages of research design related decisions
- Implementation of research question
- Critical reflection of methodological aspects of the research design concerning scientifically, ethically and sociologically consequences

Grading through:

- presentation
- internship report
- B-Certificate (not graded)

Responsible for this module:

- Prof. Dr. rer. nat. Nico Bunzeck

Teacher:

- Department of Psychology

- Prof. Dr. rer. nat. Nico Bunzeck

Literature:

- Reiß & Sarris: Experimentelle Psychologie - Von der Theorie zur Praxis - Pearson Verlag

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Working on an individual topic in preparation for the student conference

Module examination(s):
- Regular participation in the meetings of the working groups (Ü)
- Presentation in the working group as part of the practical course
- Short report 2 pages

The internship is carried out in one of the following working groups within the University of Lübeck. Exceptions can be made by arrangement:

AG Life Span
AG Auditory Cognition
Babylab
AG Work and Health
AG Cognitive Neuroscience
AG Engineering Psychology and Cognitive Ergonomics
AG Cognitive Neurology
AG Sensorimotor Systems and Visual Cognition
Social Neuroscience Lab
Social and Affective Neuroscience Lab
Neuroplasticity and Rhythms Lab

PY5300-KP12 - Job-related internship (BePra_ab22)

Duration:	Turnus of offer:	Credit points:
1 Semester	each semester	12

Course of study, specific field and term:
- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 3rd semester
- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 3rd semester

Classes and lectures:	Workload:
• experiencing a working environment (block practical course, 20 SWS)	• 360 Hours in-classroom work

Contents of teaching:
- The internship gives students the opportunity to gain an insight into their work methods in an external or internal institution with the supervision of appropriately qualified psychologists.In this way, the knowledge acquired during the studies can be deepened, or new knowledge can be gained.

Qualification-goals/Competencies:
- the ability to structurize and apply the learned theories and concepts
- the possibility to gather the first working experiences
- to expand the communication skills in professional environment
- to analyse and evaluate the concepts to possibly develop a topic for the master's thesis

Grading through:
- continuous, successful participation in practical course
- internship report

Responsible for this module:
- Prof. Dr. rer. nat. Nico Bunzeck

Teacher:
- Institute for Multimedia and Interactive Systems
- External research institutions and companies
- Department of Psychology
- Clinic for psychosomatics and psychotherapy
- Clinic of Psychiatry and Psychotherapy
- Department of Neurology
- Universitätsklinikum S-H

- Dipl.-Psych. Michaela Haller

Language:
- thesis can be written in German or English

Notes:

The application for the internship is made independently by the students. The internship is not tied to a specific semester, but the requirements specified in the SGO must be taken into account. The internship report is a prerequisite for the successful completion of the module (ungraded). Forms and guidelines for the internship can be found at:
https://www.uni-luebeck.de/studium/studiengaenge/psychologie/service-beratung/formulare.html. Please send your completed forms and the internship report to the internship officer (studium.psychologie@uni-luebeck.de)

Prerequisites for taking the module:
- None

Prerequisites for participation in module examination(s):

- Successful participation in the internship in the working group

Exam:
- PY5300-L1: Short report (ungraded), 2 pages, 100% of the module grade

PY5500-KP30, PY5500 - Master Thesis Psychology (MasterArb)

Duration:	Turnus of offer:	Credit points:
1 Semester	each semester	30

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (compulsory), psychology, 3rd semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (compulsory), psychology, 4th semester
- Master psychology 2013 (compulsory), psychology, 4th semester
- Master Psychology 2016 (compulsory), psychology, 4th semester
- Master Psychology - Cognitive Systems 2022 (compulsory), psychology, 4th semester
- Master Psychology - Clinical Psychology and Psychotherapy 2027 (compulsory), psychology, 3rd and 4th semester

Classes and lectures:

- Oberseminar (, 1 SWS)
- Master Thesis (supervised self studies, 1 SWS)

Workload:

- 900 Hours work on an individual topic (research and development) and written elaboration

Contents of teaching:

- The ability to deal with a selected topic in psychology. The format can be experimental work or a review.
- The state of the work will be presented in the colloquium

Qualification-goals/Competencies:

- the ability to write a scientific work on the selected topic in psychology.
- the ability to apply psychological methods and to present the scientific work in written form
- the ability to plan, perform and analyze psychological investigation
- the ability to present a scientific work in verbal and written form within given time

Grading through:

- Thesis according to PVO

Responsible for this module:

- Prof. Dr. rer. nat. Nico Bunzeck

Teacher:

- Department of Psychology
- Clinic for psychosomatics and psychotherapy
- Clinic of Psychiatry and Psychotherapy
- Department of Neurology

- Alle prüfungsberechtigten Dozentinnen/Dozenten des Studienganges

Language:

- thesis can be written in German or English

Notes:

Admission requirements for taking the module:
- see SGO

Admission requirements for participation in module examination(s):
- Part of the MSc thesis is a max. 20-minute presentation as part of the advanced seminar for the Master's thesis (PY5500). In terms of content, you present the theoretical background, hypotheses and methods - if already available, you can also present the results and discussion. The seminar takes place exclusively during the lecture period - usually weekly, if lectures are registered.

Module examination(s):
- PY5500-L1: Master's thesis, written paper + colloquium, 60min, 100% of the module grade

The advanced seminar may be attended from the 1st semester and should be completed at the latest with the colloquium for the Master's thesis. In addition to the above-mentioned presentation on your own MSc thesis, this includes participation in at least 4 further courses, i.e. a total of 5 dates.

(Proportion of Institute of Psychology I to Oberseminar is 100%)

The Oberseminar may be attended from the 1st semester and should be completed at the latest with the colloquium for the Master's thesis. In addition to the above-mentioned presentation on the student's own MSc thesis, this includes participation in at least 4 other events, i.e. a total of 5 dates.

(Proportion of Institute of Psychology I in Oberseminar is 100%).

For SGO from 2027 onwards, for the Master's program in Psychology - Clinical Psychology and Psychotherapy, the Master's thesis can be started as early as the third semester.

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CS4110-KP05 - Natural User Interfaces (NatUI)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	5

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester
- Master Media Informatics 2020 (compulsory), design, 1st to 3th semester

Classes and lectures:

- Natural User Interfaces (lecture, 2 SWS)
- Natural User Interfaces (exercise, 1 SWS)

Workload:

- 75 Hours private studies
- 45 Hours in-classroom work
- 30 Hours exam preparation

Contents of teaching:

- Introduction in Natural User Interfaces (NUIs)
-
- Design of natural interaction with interactive interfaces
- Design of natural collaboration with interactive interfaces
- Design of natural cross device interaction
- Design of natural interaction with Tangible User Interfaces
- Natural interaction with body, head, and gaze tracking

Qualification-goals/Competencies:

-
-

Grading through:

- portfolio exam

Responsible for this module:

- Prof. Dr. rer. nat. Hans-Christian Jetter

Teacher:

- Institute for Multimedia and Interactive Systems

- Prof. Dr. rer. nat. Hans-Christian Jetter

Literature:

- :
- :

Language:

- offered only in German

Notes:

Prerequisites for attending the module:
- None

Prerequisites for the exam:
- None

Exam:
Natural User Interfaces Portfolio Examination, the grade for which is composed as follows:
- 50% of the grade for completing a group project over the entire semester, which includes the creation of a design concept or prototype for a Natural User Interface and its written documentation.
- 50% of the grade for a written exam in which questions and tasks related to the lecture content are worked on individually.

CS4295-KP04 - Deep Learning (DEEPL)

Duration:	Turnus of offer:	Credit points:
1 Semester	each winter semester	4

Course of study, specific field and term:

- Master Computer Science 2019 (optional subject), Elective, Arbitrary semester
- Master Psychology 2016 (optional subject), Elective, Arbitrary semester
- Master Biophysics 2023 (optional subject), Elective, Arbitrary semester
- Master Media Informatics 2020 (optional subject), Elective, Arbitrary semester
- Master MES 2020 (optional subject), Elective, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (optional subject), specific, Arbitrary semester
- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester

Classes and lectures:	**Workload:**
- CS4295-V: Deep Learning (lecture, 2 SWS) - CS4295-Ü: Deep Learning (exercise, 2 SWS)	75 Hours private studies 45 Hours in-classroom work

Contents of teaching:

- Foundations and Deep Learning Basics (Learning Paradigms, Classification and Regression, Underfitting and Overfitting)
- Shallow Neural Networks (Basic Neuron Model, Multilayer Perceptions, Backpropagation, Computational Graphs, Universal Approximation Theorem, No-Free Lunch Theorems, Inductive Biases)
- Optimization (Stochastic Gradient Descent, Momentum Variants, Adaptive Optimizer)
- Convolutional Neural Networks (1D Convolution, 2D Convolution, 3D Convolution, ReLUs and Variants, Down and Up Sampling Techniques, Transposed Convolution)
- Regularization (Early Stopping, L1 and L2 Regularization, Label Smoothing, Dropout Strategies, Batch Normalization)
- Very Deep Networks (Highway Networks, Residual Blocks, ResNet Variants, DenseNets)
- Dimensionality Reduction (PCA, t-SNE, UMAP, Autoencoder)
- Generative Neural Networks (Variational Autoencoder, Generative Adversarial Networks, Diffusion Models)
- Graph Neural Networks (Graph Convolutional Networks, Graph Attention Networks)
- Fooling Deep Neural Networks (Adversarial Attacks, White Box and Black Box Attacks, One-Pixel Attacks)
- Physics-Aware Deep Learning (Physical Knowledge as Inductive Bias, PINN, PhyDNet, Neural ODE, FINN)

Qualification-goals/Competencies:

- Students get a fundamental understanding deep learning basics such as backpropagation, computational graphs, and auto-differentiation
- Students understand the implications of inductive biases
- Students get a comprehensive understanding of most relevant deep learning approaches
- Students learn to analyze the challenges in deep learning tasks and to identify well-suited approaches to solve them
- Students will understand the pros and cons of various deep learning models
- Students know how to analyze the models and results, to improve the model parameters, and to interpret the model predictions and their relevance

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Sebastian Otte

Teacher:

- Institute for Robotics and Cognitive Systems

- MitarbeiterInnen des Instituts
- Prof. Dr. Sebastian Otte

Literature:

- Goodfellow, I., Bengio, Y., & Courville, A. (2016): Deep Learning - MIT Press. ISBN 978-0262035613
- Prince, S. J. D. (2023): Understanding Deep Learning - The MIT Press. ISBN 978-0262048644

- Deisenroth, M. P., Faisal, A. A., & Ong, C. S. (2020): Mathematics for Machine Learning - Cambridge University Press, 2020. ISBN 978-1108470049
- Bishop, C. M. (2006): Pattern Recognition and Machine Learning - Springer. ISBN 978-0387310732
- Recent publications on the related topics:

Language:

- offered only in English

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Successful completion of exercise assignments as specified at the beginning of the semester

Module Exam(s):
- CS4295-L1: Deep Learning, exam, 90 min

According to the decision of the examination board of computer science of 19.8.2024 this module can be chosen by students Master Computer Science SGO from 2019 in the area of 5th elective.

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CS4575-KP04 - Sequence Learning (SEQL)

Duration:	Turnus of offer:	Credit points:
1 Semester	every summer semester	4

Course of study, specific field and term:

- Master Computer Science 2019 (optional subject), Elective, Arbitrary semester
- Master Medical Informatics 2019 (optional subject), Medical Data Science / Artificial Intelligence, 1st or 2nd semester
- Master Psychology 2016 (optional subject), Elective, Arbitrary semester
- Master Biophysics 2023 (optional subject), Elective, Arbitrary semester
- Master Media Informatics 2020 (optional subject), Elective, Arbitrary semester
- Master MES 2020 (optional subject), Elective, Arbitrary semester
- Master Entrepreneurship in Digital Technologies 2020 (optional subject), specific, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester

Classes and lectures:	Workload:
• CS4575-V: Sequence Learning (lecture, 2 SWS) • CS4575-Ü: Sequence Learning (exercise, 1 SWS)	• 75 Hours private studies • 45 Hours in-classroom work

Contents of teaching:

- Introduction to Sequence Learning (Formalisms, Metrics, Recapitulation of Relevant Machine Learning Techniques)
- Recurrent Neural Networks (Simple RNN Models, Backpropagation Through Time)
- Gated Recurrent Networks (Vanishing Gradient Problem in RNNs, Long Short-Term Memories, Gated Recurrent Units, Stacked RNNs)
- Important Techniques for RNNs (Teacher Forcing, Scheduled Sampling, h-Detach)
- Bidirectional RNNs and related concepts
- Hierarchical RNNs and Learning on Multiple Time Scales
- Online Learning and Learning without BPTT (Real-Time Recurrent Learning, e-Prop, Forward Propagation Through Time)
- Reservoir Computing (Echo State Networks, Deep ESNs)
- Spiking Neural Networks (Spiking Neuron Models, Learning in SNNs, Neuromorphic Computing, Recurrent SNNs)
- Temporal Convolution Networks (Causal Convolution, Temporal Dilation, TCN-ResNets)
- Introduction to Transformers (Sequence-to-Sequence Learning, Basics on Attention, Self-Attention and the Query-Key-Value Principle, Large Language Models)
- State Space Models (Structured State Space Sequence Models, Mamba)

Qualification-goals/Competencies:

- Students get a comprehensive understanding of most relevant sequence learning approaches
- Students learn to analyze the challenges in sequence learning tasks and to identify well-suited approaches to solve them
- Students will understand the pros and cons of various sequence learning models
- Students can implement common and custom sequence learning models for time series analysis, classification, and forecasting
- Students know how to analyze the models and results, to improve the model parameters, and to interpret the model predictions and their relevance

Grading through:

- Written or oral exam as announced by the examiner

Responsible for this module:

- Prof. Dr. Sebastian Otte

Teacher:

- Institute for Robotics and Cognitive Systems

- MitarbeiterInnen des Instituts
- Prof. Dr. Sebastian Otte

Literature:

- Goodfellow, I., Bengio, Y., & Courville, A. (2016): Deep Learning - MIT Press. ISBN 978-0262035613
- Prince, S. J. D. (2023): Understanding Deep Learning - The MIT Press. ISBN 978-0262048644
- Deisenroth, M. P., Faisal, A. A., & Ong, C. S. (2020): Mathematics for Machine Learning - Cambridge University Press, 2020. ISBN

978-1108470049
- Nakajima, K., & Fischer, I. (2021): Reservoir Computing: Theory, Physical Implementations, and Applications - Cambridge University Press, 2020. ISBN 978-1108470049
- Sun, R., & Giles, C. (2001): Sequence Learning: Paradigms, Algorithms, and Applications - Springer Berlin Heidelberg. ISBN 978-3540415978
- Bishop, C. M. (2006): Pattern Recognition and Machine Learning - Springer. ISBN 978-0387310732
- Recent publications on the related topics:

Language:

- offered only in English

Notes:

Admission requirements for taking the module:
- None, but it is recommended to complete the course Deep Learning (CS4295-KP04) first

Admission requirements for participation in module examination(s):
- Successful completion of exercise assignments as specified at the beginning of the semester

Module Exam(s):
- CS4575-L1: Sequence Learning, exam, 90 min

According to the decision of the examination board of computer science of 19.8.2024 this module can be chosen by students Master Computer Science SGO from 2019 in the area of 5th elective.

PY2919-KP04 - Stimulus programming using Psychtoolbox (PTB) with Matlab® (StimPTB)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	each winter semester	4	20

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2016 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2020 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2027 (optional subject), psychology, Arbitrary semester

Classes and lectures:	**Workload:**
• Stimulus programming using Psychtoolbox (PTB) with Matlab® (seminar, 2 SWS)	• 90 Hours private studies • 30 Hours in-classroom work

Contents of teaching:

- First steps with Psychtoolbox (Installation, start and open windows, primary sources of errors)
- Matlab functions that are important for Psychtoolbox usage
- Create visual stimuli using text, images, objects
- Interactive animation and movement of objects
- Create interactive experiments
- Working with sound
- Create small experiments with graphical user interfaces (GUIs)

Qualification-goals/Competencies:

- Ability to write functions with Psychtoolbox using Matlab.
- Create small experiments.
- Implementation of scientific research questions in experiments, development of solution strategies

Grading through:

- Exercises
- B-Certificate (not graded)

Responsible for this module:

- Dr. rer. hum. biol. Andreas Sprenger

Teacher:

- Department of Neurology

- Dr. rer. hum. biol. Andreas Sprenger
- Prof. Dr. rer. nat. Marcus Heldmann

Literature:

- Internet Documentation Psychtoobox: https://docs.psychtoolbox.org
- Internet Matlab Documentation: http://de.mathworks.com/help/matlab

Language:

- Will be offered using an audience-oriented mixture of German and English

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Seminar performance is deemed to have been achieved if at least 80% of the exercises have been successfully completed. Bachelor's and Master's students fulfill different levels of difficulty.

Module examination(s):
- PY2919-L1: Module name, exercises, submission, 100% of the module grade

Previous knowledge of Matlab is required, e.g. for Bachelor students: PY2917, for Master students: PY4880. Alternatively, Matlab introductory videos and tutorials can be worked through independently (https://de.mathworks.com/support/learn-with-matlab-tutorials.html). The Matlab Onramp course shows the most important commands and ways of working with Matlab. All tutorials on Mathworks.com are free of charge for students and employees of the University of Lübeck; a Mathworks account is required, which can be obtained via uni-luebeck.de or the student.uni-luebeck.de email address.

The course can also be offered in English, if desired by all. Previous knowledge of Matlab required, e.g. for Bachelor students PY2917-KP04, for Master students PY4880-KP04.

PY2926-KP04 - Advanced Methods in Stimulus programming using Psychtoolbox (PTB) with Matlab (StimPTB2)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	each summer semester	4	20

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Auditory Technology 2022 (optional subject), psychology, 2nd semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester
- Master Psychology 2016 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2016 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2020 (optional subject), psychology, Arbitrary semester
- Bachelor Psychology 2027 (optional subject), psychology, Arbitrary semester

Classes and lectures:

- Advanced Methods in Stimulus programming using Psychtoolbox (PTB) with Matlab (seminar, 2 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Refresh and extension of Matlab functions, essential for Psychtoolbox
- Optimization of Psychtoolbox configuration
- Advanced text usage (continuous text, text scrolling, etc.)
- Sound generation and accurate timing of playback
- Usage of response devices (e.g. Joystick, response buttons)
- Interaction with external systems (EEG, Eyetracking, MRI)
- Graphical user interface template
- Data management in experiments

Qualification-goals/Competencies:

- Extension of knowledge with Psychtoolbox using Matlab®
- Effective handling of stimulus sequences
- Operationalisation of research questions
- The students learn to create experiments so that the following evaluation steps (statistics) can be carried out optimally

Grading through:

- Exercises
- B-Certificate (not graded)

Responsible for this module:

- Dr. rer. hum. biol. Andreas Sprenger

Teacher:

- Department of Neurology

- Dr. rer. hum. biol. Andreas Sprenger
- Prof. Dr. rer. nat. Marcus Heldmann

Literature:

- Internet Documentation Psychtoobox: https://docs.psychtoolbox.org
- Internet Matlab Documentation: http://de.mathworks.com/help/matlab

Language:

- Will be offered using an audience-oriented mixture of German and English

Notes:

Admission requirements for taking the module:
- Previous knowledge of Matlab required, e.g. for Bachelor students PY2917-KP04, for Master students PY4880-KP04. Attendance of the module PY2919-KP04 is desirable.
Alternatively, Matlab introductory videos and tutorials can be worked through independently

(https://de.mathworks.com/support/learn-with-matlab-tutorials.html). The Matlab Onramp course shows the most important commands and ways of working with Matlab. All tutorials on Mathworks.com are free of charge for students and employees of the University of Lübeck; a Mathworks account is required, which can be obtained via uni-luebeck.de or the student.uni-luebeck.de email address. Attendance of module 2919 (PTB1) is desirable. For

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PY4207-KP04 - Specialization in Sports Psychology (VertSport)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	on request	4	20

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester

Classes and lectures:	Workload:
• PY-4207-S Specialization in Sport Psychology (seminar, 2 SWS)	• 90 Hours privat studies (including essay) • 30 Hours in-classroom work

Contents of teaching:

- Current research and debates in sport psychology, including the following topics:
- Sport and motivation
- Performance under pressure
- Attribution and attention
- Exercise psychology and physical activity
- Experimental sport psychology
- Judgment and decisions in sport
- Anticipation
- Applied sport psychology
- Motor development and assessment
- Perspectives on children and adults

Qualification-goals/Competencies:

- Students learn in-depth concepts, theories, models and methods of sport psychology research
- Students are able to understand and critically reflect on original literature from sports psychology research
- Students develop their own questions on the topics of sport psychology
- Students acquire skills in independent literature research and linking
- Students deepen their skills in discussing and jointly reflect on specialist content
- Students acquire in-depth skills in the research process

Grading through:

- project work
- written homework

Responsible for this module:

- Prof. Dr. Till Utesch

Teacher:

- Institute of Health Sciences

- Ludwig Piesch

Literature:

- -: Will be announced at the beginning of the course

Language:

- offered only in German

Notes:

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Prerequisites for taking the module:
- None

Prerequisites for participation in module examination(s):
- Regular and successful participation in the course / compulsory attendance of at least 80%

Exam:
- PY4207-L1: Specialization in Sports Psychology, term paper or project report (graded); the specific examination results will be announced in the course, 100% of the module grade

PY4208-KP04 - Systemic thinking and acting in psychological fields of work (SystGes)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	on request	4	20

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), psychology, Arbitrary semester

Classes and lectures:	**Workload:**
• PY4208-S: Systemic thinking and acting in psychological fields of work (seminar, 2 SWS)	• 90 Hours privat studies (including essay) • 30 Hours in-classroom work

Contents of teaching:

- Current research and debates in prevention und health promotion, including the following topics:
- Models and action concepts of systemic counselling
- Examination of systemic concepts and ways of thinking
- Reflection on solution- and resource-oriented perspectives in the counselling context
- Fundamentals of systemic counselling technics and intervention
- Perspectives on mental health from a systemic perspective

Qualification-goals/Competencies:

- Students learn basic concepts, theories, models and methods in the field of systemic counselling
- Students learn systemic counselling techniques
- They actively engage with systemic attitudes
- Students acquire skills in the application of solution- and resource-oriented work and conversation techniques in a counselling context
- Participants deepen the systemic interventions and questioning techniques they have learnt in peer groups/learning groups/intervention groups
- Students deepen the systemic interventions and questioning techniques they have learnt in peer groups/learning groups/intervention groups

Grading through:

- attendance, >90%
- see Notes
- B-Certificate (not graded)

Responsible for this module:

- Prof. Dr. Till Utesch

Teacher:

- Institute of Health Sciences

- Dipl.-Psych. Katrin Obst, Dipl.-Psych.
- Dipl.-Psych. Susen Koeslich-Strumann

Literature:

- Von Schlippe, A., & Schweitzer, J. (2016): Lehrbuch der systemischen Therapie und Beratung I: das Grundlagenwissen - Vandenhoeck & Ruprecht
- Schweitzer, J., & Von Schlippe, A. (2015): Lehrbuch der systemischen Therapie und Beratung II: das störungsspezifische Wissen - Vandenhoeck & Ruprecht
- Barthelmess, M. (2016): Die systemische Haltung: was systemisches Arbeiten im Kern ausmacht - Vandenhoeck & Ruprecht

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Regular and successful participation in the course / compulsory attendance of at least 80%

Module examination(s):
- PY4208-L1: Systemic health promotion, seminar assignment: Implementation of systemic counseling, 100% of the module grade

PY4231-KP04 - Artificial Intelligence in health sciences (WPAIHS)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	on request	4	20

Course of study, specific field and term:

- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester
- Master Psychology 2016 (optional subject), psychology, Arbitrary semester

Classes and lectures:

- PY4231 Artificial Intelligence in health sciences (seminar, 2 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Introduction into the basic principles and background of mathematical modelling and Artificial Intelligence.
- Advances in analyzing real-world data (from text to brain)
- Application in the research of healthy subjects and mental disorders (Stress, Psychosis and Depression)

Qualification-goals/Competencies:

- Students gain in-depth insights into the principles and methods of Artificial Intelligence.
- Students can understand and evaluate studies that make use of the learned computational methods
- Students understand the relevance of computational modeling for the research on mental disorders

Grading through:

- B-Certificate (not graded)
- active participation in the exercises

Responsible for this module:

- Prof. Dr. rer. nat., Dipl.-Psych. Frieder Paulus

Teacher:

- Clinic of Psychiatry and Psychotherapy

- Dr.-Ing. Alexandra Korda

Literature:

- Varun H Buch, Irfan Ahmed and Mahiben Maruthappu: Artificial intelligence in medicine: current trends and future possibilities - British Journal of General Practice 2018; 68 (668): 143-144. DOI

Language:

- offered only in English

Notes:

None

Prerequisites for participation in module examination(s):
- None

Exam:
- None

PY4241-KP04 - Translational Perspective (Animal ⇄ Human) on Hormones and Behavior (Trans)

Duration:	Turnus of offer:	Credit points:
1 Semester	normally each year in the summer semester	4

Course of study, specific field and term:

- Master Psychology - Cognitive Systems 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2027 (optional subject), psychology, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2022 (optional subject), psychology, Arbitrary semester

Classes and lectures:

- PY4241-S: Translational Perspective (Animal ⇄ Human) on Hormones and Behavior (seminar, 2 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Current research on hormones and behavior
- Discussion of animal and human research questions and methods
- Challenges in translational resarch

Qualification-goals/Competencies:

- Students know current research on hormones and behavior and can critically reflect upon them.
- Students gain deeper insight into methods in animal research in cognitive neuroscience research.
- Students can discuss and critically reflect challenges in translational research.

Grading through:

- presentation
- presentation

Responsible for this module:

- Prof. Dr. rer. nat. Ulrike Krämer

Teacher:

- Institute of Medical Psychology

- Prof. Dr. rer. nat. Ulrike Krämer

Literature:

- : - Current original literature will be announced during the course.

Language:

-

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- None

Module Exam(s):
- PY4241-L1: Seminar presentation/speech (graded), 100% of the module grade

(Share of Institute of Medical Psychology to S is 100%)

PY4890-KP04, PY4890 - Neuroanatomy (Neuroanat)

Duration:	Turnus of offer:	Credit points:	Max. group size:
1 Semester	each winter semester	4	10

Course of study, specific field and term:

- Master Psychology - Clinical Psychology and Psychotherapy 2027 (optional suject), medicine, Arbitrary semester
- Master Psychology - Clinical Psychology and Psychotherapy 2022 (optional subject), medicine, Arbitrary semester
- Master Psychology 2016 (optional subject), psychology, 3rd semester at the earliest
- Master psychology 2013 (optional subject), psychology, 1st or 3rd semester
- Master Psychology - Cognitive Systems 2022 (optional suject), psychology, Arbitrary semester
- Master Psychology - Cognitive Systems 2027 (optional suject), psychology, Arbitrary semester

Classes and lectures:

- Neuroanatomy (lecture, 1 SWS)
- Neuroanatomy (practical course, 1 SWS)

Workload:

- 90 Hours private studies
- 30 Hours in-classroom work

Contents of teaching:

- Basic introduction to the human development and structural anatomy of the central, peripheral and autonomic nervous system and sense organs; Knowledge and understanding of the main functional systems of the brain
- Modern methods of structural and functional neuroimaging
- Distinct and common neurological disorders
- During practical sessions, basic topics like vascular supply, ventricles, cranial nerves, basal ganglia, cerebellum and brainstem are analyzed and dissected

Qualification-goals/Competencies:

- Acquiring basic skills in neuroanatomy and neuroimaging
- Understanding physiology and pathophysiology by macroscopic dissection of human brains

Grading through:

- B-Certificate (not graded)

Responsible for this module:

- Prof. Dr. med. Peter König

Teacher:

- Institute of Anatomy

- Prof. Dr. med. Peter König

Language:

- offered only in German

Notes:

Admission requirements for taking the module:
- None

Admission requirements for participation in module examination(s):
- Participation in all course days on dissection is compulsory as coursework.

Module examination(s):
- PY4890-L1: Neuroanatomy, full participation, 100% of the module grade

Award of credit points and grading: