Welcome to Cognitive Science in Osnabrück

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The Cognitive Science Landscape in Osnabrück

The website:
http://www.cogsci.uos.de
The Cognitive Science Landscape in Osnabrück

- Study Programs
  - Cognitive Science
    - Bachelor
    - Master

- Institute of Cognitive Science (IKW): Research

- Cognitive Science Graduate School
Cognitive Science in Osnabrück
a short history

1989 The study program Computational Linguistics And Artificial Intelligence (CL & AI) starts

1998 Bachelor Program in Cognitive Science starts, based on the „Magister“ study program CL & AI (funded by the DAAD)

2001 Institute of Cognitive Science is founded (funded by the Volkswagen Foundation)

2002 Implementation of the International Graduate School funded by the DAAD

2003 Most of the current working groups are established.

2009 Expansion of the Institute (funded by the Volkswagen Foundation)
The institute will establish more working groups soon:
- Biologically oriented Computer Vision (full professorship)
- Cognitive Modeling (junior professorship)
- Neuro/Psycho-Linguistics (junior professorship)
Cognitive Science in Osnabrück

**Institute**  
Research Groups:
- Artificial Intelligence
- Cognitive Psychology
- Computational Linguistics
- Neurobiopsychology
- Neurocybernetics
- Neuroinformatics
- Philosophy of Cognition
- Personality Research
- Neurobiology
- Knowledge-based Systems

**Bachelor**  
“Wahlpflichtbereiche”
- Artificial Intelligence
- Cognitive Psychology
- Computational Linguistics
- Computer Science
- Neurobiology
- Neuroinformatics
- Mathematics
- Philosophy of Cognition

**Master**  
“Schwerpunkte”
- Artificial Intelligence
- Cognitive Psychology
- Linguistics and Computational Linguistics
- Neuroinformatics and Robotics
- Neuroscience
- Philosophy of Mind and Cognition
Research Areas

• Artificial Intelligence
  – Head: Prof. Dr. Kai-Uwe Kühnberger
  – PD Dr. Helmar Gust,
    Ulf Krumnack MA,
    Dipl. Ekaterina Ovchinnikova

  – Topics of interest
    • Non-classical forms of reasoning, in particular, analogical reasoning and inferences.
    • Knowledge representation and ontologies.
    • Representation of logical inferences with neural networks
    • Intelligent tutoring systems
    • Logic programming, constraint logics.
Research Areas

• Cognitive Psychology
  – Dr. Jaqueline Griego, Ph.D.
  – Prof. Dr. Franz Schmalhofer

  – Topics of interest
    • Text comprehension and inferencing
    • creativity
    • situated cognition
    • cognitive modeling
Research Areas

• Neuroinformatics
  – Head: NN; position temporarily filled by Dr. Gordon Pipa
  – Dipl.-Inf. Stephan Timmer

  – Topics of interest
    • Machine learning applied to real-world problems
    • Supervised learning and reinforcement learning
    • Self-organizing neural networks and rule extraction
    • Theory of recurrent networks.

• The Group of Prof. Riedmiller left the Institute. He is now at the University of Freiburg
Research Areas

• Neurocybernetics
  – Head: Prof. Dr. Frank Pasemann
  – Ferry Bachmann
    Christian Rempis, MSc
    Dipl.-Biol. Arndt von Twickel

  – Topics of interest:
    • Sensorimotor coordination of movement
    • Self-regulating neurons
    • Embodied cognition
    • Evolutionary robotics and artificial life
    • Neural behavior control of autonomous systems.
Research Areas

• Computational Linguistics
  – Head: Prof. Dr. Peter Bosch
  – Dr. Cornelia Ebert
    Prof. Dr. Stefan Evert
    Dr. Carla Umbach

  – Topics of interest
    • Natural language semantics
    • Productivity in natural language
    • Statistical NLP
    • Grammar
    • Information structure
Research Areas

• Philosophy of Cognition
  – Head: Prof. Dr. Achim Stephan
  – Prof. Dr. Wolfgang Lenzen
    Dr. Vera Hoffmann
    Prof. Dr. Sven Walter

  – Topics of interest
    • Philosophy and cognition
    • Philosophy of science
    • Theories of emergence
    • Emotions
    • Logic
    • Mind reading.
Research Areas

• Neurobiopsychology
  – Head: Prof. Dr. Peter König
  – PD Dr. Ulrich Ansorge
    MS Shah Khalid                Tim Kietzmann, M. Sc
    Dr. Saskia Nagel              Nora Nortmann, M.Sc.
    Selim Onat                    Johannes Steger, M.Sc.
    Dipl. Michael Plöchl          Frank Schumann, M.Sc.
    José Pablo Ossandón, M.Sc.    Dr. Daniel Weiller

  – Topics of interest:
    • Experimental and theoretical studies of sensory processing and sensory
      motor integration in the mammalian cortex
    • The role of top-down signals, their relation to the fast dynamics,
      learning and plasticity in the neural network
    • Insights obtained from this work are transferred to real-world
      applications
Research Areas
of some associated members from other faculties

• Knowledge-Based Systems
  – Prof. Dr. Joachim Hertzberg

  – Topics of interest
    • Artificial Intelligence
    • Autonomous mobile robots
    • Sensor data interpretation
    • Semantic mapping
    • Action planning
    • Plan-based robot control
Research Areas
of some associated members from other faculties

• Personality Research
  – Prof. Dr. Julius Kuhl

  – Topics of interest
    • Motivation
    • Self-regulation
    • Personality development

• Neurobiology
  – Prof. Dr. Gunnar Jeserich

  – Topics of interest
    • Functional differentiation of retinal ganglion cells
    • potassium channels in neural signal processing
Important People

- The Director of the IKW
  - Prof. Dr. Peter König
- The Study Dean of Cognitive Science
  - Prof. Dr. Achim Stephan
- General study advisor for students
  - PD Dr. Helmar Gust
- Examination office
  - Anna Rushing-Jungeilges (31/428)
- The IKW office (Geschäftsstelle)
  - Beate Eibisch
    - Notice: Mrs. Eibisch has office hours!!
The Study Program
Cognitive Science Bachelor

What you must take, what you should take, what you can take, what you should not take, what you must not take...
Foundations of Cognitive Science

- An optional course for first-year students in order to get some ideas what is going on in the institute.
  - There will be approx. 8-10 talks by teachers of the teaching unit Cognitive Science.
Other ways of looking beyond your course work:

The weekly

Research Colloquium of the Institute

every Wednesday 6:00 pm – 8:00 pm (31/449a)

Current program can be found on the website
http://www.ikw.uni-osnabrueck.de/en/events
Structure of the Bachelor Program

10 Compulsory Fields
100 ECTS

Module 1
oral exam

Module 2
oral exam

Module 3
oral exam

Module 4

Module 5

Optional courses ~21 ECTS

four modules out of eight

Bachelor Thesis 15 ECTS

44 – 56 ECTS
In General

• General information concerning the programs can be found in the examination and the study regulations:
  http://www.ikw.uni-osnabrueck.de/en/cogsci/bachelor/regulations
  – Please start to read these documents now, not at the end of your studies.

• The study plan is intended to make things easier for you.
  – If possible study according to the study plan.
Types of Courses

• Compulsory courses
  – are assigned to compulsory fields ("Pflichtbereiche")
  – You have to take enough compulsory courses to cover all ten compulsory fields

• Optional compulsory courses
  – are assigned to optional compulsory fields (modules or examination fields or "Wahlpflichtbereiche")
  – You have to take enough optional compulsory courses to cover five of the eight modules
  – You have to do at least three oral exams (for two module you can hand-in the graded prerequisites)

• Optional courses
  – You can take any of the courses offered in the program as an optional course

• The types of the courses you find in our course database:
  – http://www.ikw.uni-osnabrueck.de/en/lectures
  – The study commission (and only the study commission) decides on the assignment to examination fields. These decisions are recorded in this database (and not in StudIP)
## Compulsory Fields

1. Fundamentals of Mathematics  
2. Fundamentals of Neurobiology / -anatomy  
3. Structures of Algorithms  
4. Logic Programming and Artificial Intelligence  
5. Theory and Methods of Computational Linguistics  
6. Theory and Methods of  
   Cognitive Psychology / Neuropsychology  
7. Theoretical Neuroscience  
8. Empirical Methods of Cognitive Science  
9. Foundations of Logic  
10. Philosophy of Mind / of Cognition
## Study Plan

**this is a recommendation**

1. Semester (≥40 ECTS)  
   - Foundations of Logic I  
   - Introduction to Neurobiology  
   - Introduction to Linguistics  
   - (Experiment Planning and Statistic I  
   - Algorithms  
   - Foundations of Cognitive Science  
   - (Mathematics  

2. Semester (≥32 ECTS)  
   - Cognitive Psychology (/ Neuropsychology)  
   - Programming in Logic  
   - Philosophy of Mind  
   - Computational Linguistics  
   - Sensory Physiology  
   - (Modules
Study Plan
A remark on the alternatives for the compulsory Math field:

- The will be no Math Course during the Summer term!
  - So you have to do Math either in the first Semester
    (e.g. moving Experiment Planning and Statistics I to the third semester)
    Some students recommend this version.
  - or you have to do Math in the third semester
- The alternatives are
  - Mathematik I (take this if you want do do a module exam in Math)
  - Mathematik für Anwender
  - There is Math for physicists, too, and it’s probable that this will be recognized for Cognitive Science, but the study commission has still to decide on this.
    (don’t worry about the fact, that it’s called “Mathematik für Physiker 2”, it’s definitely a first semester course)
Requirements to enter the 3rd Semester

You need more then 40 ECTS to enter the 3rd Semester!
Study Plan
this is a recommendation

3. Semester (≥28 ECTS)  ECTS
   - (Mathematics  12)
   - (Cognitive Neuropsychology  4)
   - Introduction to Theoretical Neuroscience  12
   - (Experiment Planning and Statistic I  12)
   - Modules  12

4. Semester (~30 ECTS)  ~30
   - Modules

5. Semester
   - Semesters abroad
   - Modules / optional courses  ~30

6. Semester (≥15 ECTS)  ~8
   - Modules / optional courses
   - Bachelor Thesis  15
Module
Fundamentals of Neurobiology

- Compulsory field 2  8 ECTS
- Fundamentals of Neurobiology and biopsychological foundations / Neuroanatomy 8 ECTS
- Examination requirements and contents:
  extended knowledge of
  - fundamentals of the cell-biological
  - neuro-anatomical signal processing in the nervous systems
Module: Neurocomputer Science

- Compulsory field 7 12 ECTS
- Neural Networks 12 ECTS

Examination requirements and contents:
- extended knowledge of
  - theoretical neuroscience
  - the most important models of neural networks.
Module: Artificial Intelligence

- Compulsory field 4 8 ECTS
- Artificial Intelligence 12 ECTS

Examination requirements and contents:
extended knowledge in the areas of
  - logic / functional programming
  - problem-solving and search
  - knowledge representation and knowledge processing
  - machine learning.
Module: Computational Linguistics

- Compulsory field 5 12 ECTS
- Computational Linguistics 8 ECTS

**Examination requirements and contents:**
extended knowledge in representing and processing
- morphological
- Lexical
- syntactic
- semantic
structures
Module: Fundamentals of Mathematics

- Compulsory field 1 12 ECTS
- Mathematics 12 ECTS
- Examination requirements and contents: extended knowledge of
  - the analysis of one variable
  - linear algebra, probability theory or statistics.
Module: Philosophy of Cognition / of Mind

• Compulsory field 10 8 ECTS
• Philosophy 8 ECTS
• Examination requirements and contents:
  fundamental knowledge in the areas of
  – the philosophy of cognition / of mind
  – logic,
  – the philosophy of language
  – epistemology
  – philosophy of science or ethics.
Module: Cognitive Psychology

- Compulsory field 6 8 ECTS
- Methods of experimental Psychology or Psycholinguistics or Cognitive Modeling 8 ECTS
- Examination requirements and contents:
  fundamental knowledge in the following areas:
  - perception, attention, learning and memory
  - language and knowledge representation
  - thinking and problem-solving
  - action control, psycho-motor functions
  - emotion and motivation
  - neuropsychology, respectively cognitive neuroscience.
Module: Computer Science

• Compulsory field 3 12 ECTS
• Theoretical, practical or applied computer science 12 ECTS
• Examination requirements and contents: extended knowledge in the areas of
  – structure of algorithms and programming
  – theoretical, practical or applied computer science.
Study Advice
(not only for Bachelor Students)

In case of problems try the following solution strategies (more or less in the given order):

• Consult our web page:
  http://www.cogsci.uni-osnabrueck.de/

• Consult the examination regulations:
  http://www.ikw.uni-osnabrueck.de/en/cogsci/bachelor/regulations

• Consult our Mentoring Tutors Manuel Ebert or Sven Spöde
  Mentoring@cogsci.uni-osnabrueck.de

• Consult me (hgust@uos.de)

• Consult the Study Dean
  – Achim Stephan: acstepha@uos.de

• Contact your representatives in the study commission
Mentoring program:

• Please contact
  Manuel Ebert
  Sven Spöde
  E-mail address: mentoring@cogsci.uos.de
  if you have
  – Special interests in a special field
  – Problems in fulfilling the study requirements
  – Problems with courses / problems with teachers
  – Problems in organizing your semester abroad
  – Any other problems concerning your studies
Study Advice for Bachelor Students

If you have very special questions related to the subfields (recognizing study efforts from abroad, etc.)

• Artificial Intelligence  \hspace{1cm} Kai-Uwe Kühnnberger
• Cognitive Psychology and Psychology  \hspace{1cm} Jaqueline Griego
• Computer Science and Neuroinformatics  \hspace{1cm} Franz Schmalhofer
• Linguistics & Computational Linguistics  \hspace{1cm} Helmar Gust
• Mathematics  \hspace{1cm} Stefan Evert
• Neurobiology  \hspace{1cm} Winfried Bruns
• Neurobiopsychology  \hspace{1cm} Gunnar Jeserich
• Philosophy and Philosophy of Cognition  \hspace{1cm} Peter König
• Philosophy and Philosophy of Cognition  \hspace{1cm} Achim Stephan
Students from other Programs

• Those of you who are
  – currently enrolled in other programs
    (due to problems in fulfilling the math requirements),
  – but intend to change to the CogSci program
please consult me after this session.
Questions, Remarks, Comments...?