Computational Neuroscience: Neural Dynamics

Gregor Schöner

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Language

- slides will be in English
- lectures will be in English
- ask questions in German and ask for clarification of terms
Schedule

- Lecture every Thursday 14:15 to 16:00
- Exercise session from 16:15 to 17:00
Who am I

- theoretical physicist by training, but working in theoretical neuroscience/cognitive science and motor control for over 20 years
- second life as a roboticist/computer vision person
- way stations: Saarbrücken, Stuttgart, Boca Raton Florida, Bochum, Marseille, Bochum...
What am I?

- Chair Theory of Cognitive Systems
- Director of the Institut für Neuroinformatik
- joint appointment in the Faculty of Physics and Astronomy and in the Faculty of Electrical Engineering and Information Technology
My research

research in two related areas

- embodied cognition: motor control, movement planning and representation, decision making, action and spatial memory, visual working memory, perceptual representations, motion perception, grounding of language

- autonomous robotics: scene representation, object recognition, behavioral organization, reaching and grasping, timing, learning

- based on the theoretical approach of “DST” (dynamical systems theory) and “DFT” (dynamical field theory)
Dr. Mathis Richter

- will run the exercises
- also available for questions etc.
- mathis.richter@ini.rub.de
- postdoc at the INI who works on the perceptual grounding of concepts and the generation of conceptual descriptions from perception
Who are you?
Please send this information
to mathis.richter@ini.rub.de
Name, First name
Studienfach
Fachsemester
(Prüfungsordnung)
Matrikelnummer
Web page

www.ini.rub.de

then search for course under teaching/courses…
Exercises are critical to the learning experience!

- reading… understanding technical texts, understanding problem descriptions
- writing technically, making drawings, documenting thought

- there will be readings, to which exercise sheets will be directed
- there will be an essay exercise to practice writing and organized text
Exercises

- hand-outs via the web page

- ... hand-ins on paper or by email to Mathis Richter

- hand-ins will be corrected by a team, led by Mathis and will receive a “grade”

- graded hand-ins will provide bonus point that can improve your final mark by 10% or more
“Hands-on” sessions

- we will have a few “hands-on” sessions “life” in the exercise hour…

- to do simulations, to analyze equations, practice drawings etc.

- you work in groups/alone and we interact with you…
Matlab

- some exercises will make use of Matlab (the “matrix laboratory”), an interpreted language for numerical simulation.

- a free license is available for RUB students… go to

  http://it-services.ruhr-uni-bochum.de/software/matlab
Rules for credit

- see the online “rules” document…
- oral exam needed for passing
- bonus points from exercises
I’ll insert tutorials, special units that give background you might be missing... in response to feedback from you, e.g.

- mathematical concepts like nonlinear dynamics and instabilities
- neuroscience background like fundamentals of neurophysics, neuroanatomy, neurophysiology
- cognitive science background like connectionism vs. information process, symbolic computation etc.
Individual tutoring

- we offer help, e.g. for those students with less of a mathematical background... ask us/me and we arrange a tutorial session

- or also for those you who struggle with other parts, the conceptual language, the neural background..
We will be following in part a new book.
We will essentially do the first 4 chapters (of 15)

You will get to read them...