



UNIVERSITY OF TECHNOLOGY  
IN THE EUROPEAN CAPITAL OF CULTURE  
CHEMNITZ

# Neurocomputing

Foreword

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<https://tu-chemnitz.de/informatik/KI/edu/neurocomputing>

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## Background

- 2002: Master in Electrical Engineering (Supélec).
- 2006: Ph.D in Computer Science (Inria).
  - Emergence of sensorimotor function on a distributed numerical substrate.
- Postdoc in Psychology (Münster).
- 2011: lecturer at TU Chemnitz:
  - Habilitation in 2017:
    - On the role of dopamine in motivated behavior: a neuro-computational approach.
  - Courses: machine learning, computer vision, deep RL.
- Erasmus coordinator: <https://www.tu-chemnitz.de/informatik/international/erasmus.php.en>

## Research

- Computational neuroscience
  - Dopamine, biological reinforcement learning
  - Basal Ganglia, decision-making
  - Cerebellum, motor control
  - Hippocampus, memory
- Machine learning
  - Reservoir computing
  - Successor representations
  - Graph neural networks
  - Deep reinforcement learning

# Course description

- **Neurocomputing** (573180) replaces the previous Machine Learning (573050) course.
- If you have ML in your study regulations, you **can** take Neurocomputing instead.
- Reinforcement Learning is now in the **Deep Reinforcement Learning** (573140) course.
  - Master Neurorobotik.
  - Master Informatik (Multi-Agent systems) and angewandte Informatik (Themenschwerpunkte Informatik I/II).
  - Master Data Science.
- Other ML-related courses at the University:
  - Introduction to AI I (Inf, Prof. Hamker) and II (Inf, Prof. Röhrbein)
  - Introduction to Data Science (Mathe, Prof. Ernst)
  - Image Processing and Pattern Recognition (ETIT, Prof. Mößner)

## Course description

- One lecture and one exercise per week.
- All materials are at:

<https://www.tu-chemnitz.de/informatik/KI/edu/neurocomputing/notes>

- Written (online) exam, 90 minutes, 5 credit points.
- Registration and forum on OPAL:

[https://bildungsportal.sachsen.de/opal/auth/RepositoryEntry/21637267460.](https://bildungsportal.sachsen.de/opal/auth/RepositoryEntry/21637267460)

# Exercises

- Exercises : programming in Python the algorithms seen in the course (using tensorflow, keras, scikit-learn).
- The first exercises are a tutorial on Python and Numpy (common with DRL and CV).
- Exercises are there to better understand the algorithms and learn to use the modern tools.
- There will be no programming question at the exam, but some may be related to the exercises.