| Module MA-INF 4204 | **Technical Neural Nets** | | |
|---|---|---|---|
| **Workload** 180 h | **Credit points** 6 CP | **Duration** 1 semester | **Frequency** every year |
| **Module coordinator** | Prof. Dr. Joachim K. Anlauf | | |
| **Lecturer(s)** | Prof. Dr. Joachim K. Anlauf, Dr. Nils Goerke | | |
| **Classification** | **Programme** M. Sc. Computer Science | **Mode** Optional | **Semester** 1., 2. or 3. |
| **Technical skills** | Detailed knowledge of the most important neural network approaches and learning algorithms and its fields of application. Knowledge and understanding of technical neural networks as Non-Von Neumann computer architectures similar to concepts of brain functions at different stages of development | | |
| **Soft skills** | The students will be capable to propose several paradigms from neural networks that are capable to solve a given task. They can discuss the pro and cons with respect to efficency and risk. The will be capable to plan and implement a small project with state of the art neural network solutions. | | |
| **Contents** | Multi-layer perceptron, radial-basis function nets, Hopfield nets, self organizing maps (Kohonen), adaptive resonance theory, learning vector quantization, recurrent networks, back-propagation of error, reinforcement learning, Q-learning, support vector machines, pulse processing neural networks. Exemplary applications of neural nets: function approximation, prediction, quality control, image processing, speech processing, action planning, control of technical processes and robots. Implementation of neural networks in hardware and software: tools, simulators, analog and digital neural hardware. | | |
| **Prerequisites** | none | | |

| **Format** | Teaching format | Group size | h/week | Workload[h] | CP |
|---|---|---|---|---|---|
| | Lecture | 60 | 2 | 30 T / 45 S | 2.5 |
| | Exercises | 30 | 2 | 30 T / 75 S | 3.5 |
| | T = face-to-face teaching; S = independent study | | | | |

| **Exam achievements** | Written exam (graded) |
|---|---|
| **Study achievements** | Successful exercise participation (not graded) |
| **Forms of media** | |
| **Literature** | • Christopher M. Bishop: Neural Networks for Pattern Recognition, Oxford University Press, ISBN-10: 0198538642, ISBN-13: 978-0198538646 <br> • Ian T. Nabney: NETLAB. Algoriths for Pattern Recognition, Springer, ISBN-10: 1852334401, ISBN-13: 978-1852334406 |