Module

Quantum Machine Learning

<table>
<thead>
<tr>
<th>Code</th>
<th>Instruction language</th>
<th>ECTS credits</th>
<th>Attendance time</th>
<th>Duration</th>
<th>Cycle</th>
<th>Coordinator</th>
<th>Instructors</th>
<th>Allocation to study programmes</th>
<th>Recommended prerequisites</th>
<th>Learning objectives</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>English</td>
<td>4</td>
<td>3 hours per week</td>
<td>1 semester</td>
<td>Irregularly</td>
<td>Dean of Physics Studies</td>
<td>Dr. Sabine Wölk</td>
<td>Physics M.Sc., elective module</td>
<td>Theoretical Quantum Mechanics (mandatory)</td>
<td>Students who successfully passed this module</td>
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<td>Wirtschaftsphysik M.Sc., elective module</td>
<td>Theory of Quantum Information (helpful but not required)</td>
<td>• are familiar with basic concepts of classical machine learning such as supervised, unsupervised and reinforcement learning</td>
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<td>• know examples of quantum algorithm which provide advantages for machine learning</td>
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Syllabus

- Neural networks
- Support vector machines
- Restricted Boltzmann machine
- Reinforcement learning
- Quantum annealing
- Amplitude amplification

Literature

- Lämmel and Cleve, “Künstliche Intelligenz”, Hanser Verlag, 2008

Teaching and learning methods

- Lecture (2 hours per week)
- Exercise (1 hours per week)

Workload

- 30 hours lecture (attendance time)
- 15 hours exercise (attendance time)
- 75 hours self-study
- Total: 120 hours

Assessment

- The module assessment consists of a graded written or oral exam. The examination form will be announced at the beginning of the lecture.

Examination

- The module grade is equal to the examination grade.

Basis for

- Research in the field of Quantum Technologies