

# Courses in English

## Course Description

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| <b>Department</b>              | 07 Computer Science and Mathematics  |
| <b>Course title</b>            | <b>Quantum Software Development</b>  |
| <b>Hours per week (SWS)</b>    | 4  |
| <b>Number of ECTS credits</b>  | 5  |
| <b>Course objective</b>        | Students understand the concepts of quantum software development. They are able to apply paradigms and to explain the advantages and limitations of quantum computing. The students are able to implement and test quantum algorithms on different quantum computing platforms (IBM, Google, AWS, Azure)                 |
| <b>Prerequisites</b>           | Python, Linear Algebra   |
| <b>Recommended reading</b>     | Website: <a href="https://qiskit.org">https://qiskit.org</a> ;<br>J. D. Hilary: Quantum Computing: An Applied Approach, Springer;<br>Ch. Corbett Moran: Mastering Quantum Computing with IBM QX, Packt;<br>Website: <a href="https://cirq.readthedocs.io/en/stable/#">https://cirq.readthedocs.io/en/stable/#</a>        |
| <b>Teaching methods</b>        | lecture (2 SWS) + exercises (2 SWS)  |
| <b>Assessment methods</b>      | oral exam  |
| <b>Language of instruction</b> | English  |
| <b>Name of lecturer</b>        | Sabine Tornow  |
| <b>Email</b>                   | <a href="mailto:sabine.tornow@hm.edu">sabine.tornow@hm.edu</a>   |
| <b>Link</b>                    | <a href="https://www.cs.hm.edu/die_fakultaet/ansprechpartner/professoren/tornows/index.de.html">https://www.cs.hm.edu/die_fakultaet/ansprechpartner/professoren/tornows/index.de.html</a>  |
| <b>Course content</b>          | Quantum Computing<br>Quantum algorithms (quantum fourier transformation, search algorithm);<br>Quantum error correction<br>Hands on programming of<br>algorithms for chemistry, finance, machine learning, optimisation, graph theory as well as<br>hybrid algorithm (e.g.. Quantum Approximate Optimization Algorithm). |
| <b>Remarks</b>                 |  |