

L.079.05706

Introduction to Quantum Computation (in English)

Syllabus

Course code:	L.079.05706
Course Level:	Masters
Prerequisites:	A background in Linear Algebra. No background in quantum mechanics is required.
Instructor:	Prof. Dr. Sevag Gharibian
Office:	04.225
Office Hours:	13:00 – 14:00 Wednesdays
Email:	sevag.gharibian@upb.de
Classroom:	02 (lecture), D1.312 (tutorial)
Class website:	http://groups.uni-paderborn.de/fg-qi/courses/UPB_INTRO_QUANTUM/W2022/UPB_INTRO_QUANTUM.html

1.0 – Major Topics Covered:

- Quantum mechanics; state vectors, density matrices, distance measures, no-cloning theorem.
- Quantum entanglement and non-locality; pure state versus mixed state separability, CHSH inequality, Werner States.
- Quantum algorithms; teleportation, Deutsch's algorithm, Simon's algorithm, factoring, unstructured search.
- Quantum error-correcting codes; stabilizer codes.
- Quantum information theory

2.0 – Textbook(s):

[Quantum Computation and Quantum Information](#), Nielsen and Chuang

3.0 – Class Schedule:

- Lecture: 8:00 – 11:00 Friday
- Tutorial: 9:00 – 11:00 Thursday
 - Note: Tutorials are held beginning Week 3.
- Final Exam: TBA

4.0 – Grading Scheme:

- The full grade for the course is based on the final exam, which will be written. The grading scheme for the final exam is as follows:

95% - 100%	: 1,0
90% - 94%	: 1,3
85% - 89%	: 1,7
80% - 84%	: 2,0
75% - 79%	: 2,3
70% - 74%	: 2,7
65% - 69%	: 3,0
60% - 64%	: 3,3
55% - 59%	: 3,7
50% - 54%	: 4,0
0 - 49%	: 5,0

- *Mandatory homework requirement:* Homeworks are only graded for completion, not correctness. **You must complete at least 50% of the homeworks to write the final exam.**
- *Bonus points for homework:* Homeworks are only graded for completion, not correctness. A homework which is handed in receives 1 point if ALL questions are completed, and 0.5 points if at least half of the questions are completed done. Anything less than half the questions receives 0 points.

The bonus points for completing homeworks is as follows:

>= 60% of points on homeworks:	1 step bonus (eg 1,3 to 1,0)
>= 80% of points on homeworks:	2 steps bonus (eg. 1,7 to 1,0)