General Information:

Name of Course:

QUANTUM INFORMATICS, CRYPTOGRAPHY

Course Code:	IVM180ANMI
Semester:	2th
Number of Credits:	5
Allotment of Hours per Week:	2 Lecture Lessons/Week
Evaluation:	Two Midterm Exam (with grade) and one Homework
Prerequisites:	None

Instructors:

Dr. Levente Szabó, instructor
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Office Hours: Wednesday 16:30-17:15

Introduction, Learning Outcomes:

After successful completion of the course students will be enlightened upon the main concepts of some parts of the quantum physics, quantum information, and quantum computation. These skills will help them to make their future work better. During the semester, following topics will be taught: basics of quantum mechanics, searching, and factoring quantum algorithms, some quantum cryptographycal protocols, quantum teleportation.

General Course Description and Main Content:

Short overview of the subject: basics of quantum mechanics, quantum bits, quantum gates, no cloning theorem, theory of entanglement, teleportation, dense coding, Deutsch-algorithm, searching algorithms, error correcting, BB84 and B92 protocols.

Methodology:

Demonstration of theoretical background in lectures.

Schedule:

Weeks	**Topics**	**Midterm exam**
1.	Physical quantities as operators, Heisenberg's commutation relations , the linear harmonic oscillator	
2.	Quantum mechanical description of the physical state, physical meaning of the state function	
3.	Neutron-interfenerence and the exact interpretation of the Born-hypothesis	
4.	Quantum bits, quantum gates	
5.	No cloning theorem	
6.	Theory of entanglement, dense coding	
7.	Bell enequalities	1st midterm test from topics 1-6.
8.	Quantum teleportation	
9.	**Spring holiday.**	
10.	Deutsch algorithm	
11.	Grover algorithm	
12.	Quantum error correcting	
13.	BB84 protocol	
14.	B92 protocol	
15.		Second midterm test from topics 7-14, Homework.

Attendance:
Attending is required all classes, and will impact the grade (max. 5%). Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Evaluation + Grading

Homework and Attendence (20%)
Midterm Exam # 1 (40%)
Midterm Exam # 2 (40%)

1. Satisfactory work: Achieving more than 60% of the total points in the two written midterm assessments during the semester then the grading scale table will be applied to obtain the final result.

2. Unsatisfactory work: When the total points of the two midterm written tests are less than 61% together then a new test need to write from the whole topics of the semester in the exam period. A minimum of 61% is required to pass on this exam.

Grading Scale:

Numeric Grade:	5	4	3	2	1
Evaluation in points:	91%-100%	81%-90%	71%-80%	61%-70%	0-60%

PTE Grading Policy:
Information on PTE's grading policy can be found at the following location:

Students with Special Needs:
Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:
[1] John Preskill, California Institute of Technology, Lecture Notes for Physics 229: Quantum Information and Computation, 1998