KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

UNIWERSYTET GDAŃSKI

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

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Course title **Introduction to physics**	**ECTS code** 13.2.0423

Name of unit administrating study
Department of Mathematics, Physics and Informatics

Studies

Faculty	**Field of study/ phd studies/doctoral school/postgraduate studies**	**Type**	**Form**
Quantum Information Technology	MSc studies	stationary	

Teaching staff
prof. Marek Żukowski, dr Adrian Kołodziejski, dr Krzysztof Szczygielski

Forms of classes, the realization and number of hours

A. Forms of classes, in accordance with the UG Rector's regulations
Lecture, auditory classes

B. The realization of activities
classes in the teaching room of the University of Gdańsk
blended learning

C. Number of hours
Lecture: 30, exercises: 30

ECTS credits

Total: 5 ECTS including:
30 h of lecture – 1 ECTS point;
30 h of exercises – 1 ECTS point;
30 h of consultation – 1 ECTS point;
60 h of student's own work - 2 ECTS points.

The academic cycle
According to study program

Type of course
mandatory

Language of instruction
English

Teaching methods
problem lecture
lecture with multimedia presentation

discussion
case analysis
problem solving

Form and method of assessment and basic criteria for evaluation or examination requirements

A. Final evaluation, in accordance with the UG study regulations
Exam
Credit with grade

B. Assessment methods
Exercises: tests with problems
Lecture: written-oral exam. Problems should be given to the students two-weeks before the end of the course, and should cover the whole course

C. The basic criteria for evaluation or exam requirements
Exercises:
Classes:
Correctly solved problems in minimum 50%
Lecture:
Marking of the written part, plus a discussion with the student related with the written part, but not only. Student bids for a specific grade, and after that professor selects questions/problem from the list.

D. Method of verification of the established effects of education

established effect of education	exam	activity	tests

	W01	+		
	U01		+	
	U02		+	+
	K01		+	

Required courses and introductory requirements

A. Formal requirements

Bachelor's degree in mathematics or informatics in the case of students who are bachelors in physics the course will to a large extent a review of things learned earlier in a way which shows various links.,.

B. Prerequisites

Elementary knowledge of physics and good knowledge of general university level mathematics for students of exact sciences (calculus, algebra)

Aims of education

A quick overview of modern physics with accent on theory (not including thermodynamics, statistical physics and open systems, as these will be covered in other lectures)

Course contents

Brief introductions to:

- **Newtonian dynamics.**
- **Lagrange and Hamiltonian formalism. Classical symmetries.**
- **Classical electrodynamics.**
- **Basic of special and general relativity.**
- **Quantum mechanics.**
- **Bosons and fermions.**
- **Quantum electrodynamics.**
- **Other topics concerning fundamental laws of physics (emerging for discussions with the students).**

Bibliography of literature

A. Literature required to pass the course

- **The Theoretical Minimum: What You Need to Know to Start Doing Physics Illustrated Edition by Leonard Susskind, and , George Hrabovsky ISBN-13: 978-0465075683, ISBN-10: 0465075681**
- **Quantum Theory: Concepts and Methods, Asher Peres, Published by (Springer), ISBN 10: 0792336321 ISBN 13: 9780792336327**
- **The Principles of Quantum Mechanics (International Series of Monographs on Physics), Dirac, P. A. M., Published by Clarendon Press (1982), ISBN 10: 0198520115 ISBN 13: 9780198520115**
- **Introduction to the Theory of Relativity, Peter G Bergmann, ISBN: 0486632822B.**

The learning outcomes (for the field of study and specialization) *K_W01* *Student has extensive knowledge of general physics and advanced knowledge in the area of quantum information theory; knows the history of the development of quantum information theory and its importance for the progress of science, world cognition and social development* *K_W06* *Student has knowledge of the current trends in the*	**Knowledge** W01: Students have a general knowledge about modern description of basic laws of physics (K_W01, K_W06) **Skills** U01 Ability to understand texts and paper using methods of basic modern physics (K_U04) U02 Students are able to solve problems within various areas of modern physics (K_U01) **Social competence** K01 Being able to see quantum technologies in a broader perspective. Having and education allowing PhD studies not only in quantum information but also physics. Being able to debunk pseudo-science (K_K06)

development of physics, in particular within the quantum information theory *K_U01* *Student is able to apply the scientific method and physical knowledge in solving problems formulated in the theory of quantum information, carrying out experiments and making conclusions* *K_U04* *Student can find the necessary information in professional literature, both in databases and other sources; can recreate the reasoning or the course of an experiment described in the literature, taking into account the assumptions and approximations made* *K_K06* *Student is aware of the dangers of obtaining information from unverified sources, including those from the Internet*	
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