KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI
Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego
UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Introduction to physics	13.2.0423

Name of unit administrating study

Faculty of Mathematics, Physics and Informatics

Studies

faculty	field of study		
Faculty of Mathematics, Physics and Informatics	Quantum Information Technology	type	second tier studies (MA)
		form	full-time
		specialty	all
		specialization	all

Teaching staff

prof. dr hab. Marek Żukowski; mgr Paulo Cavalcanti; dr Krzysztof Szczygielski; dr Adrian Kołodziejski

Forms of classes, the realization and number of hours

Forms of classes

Auditorium classes, Lecture

The realization of activities

classroom instruction, online classes

Number of hours

Auditorium classes: 30 hours, Lecture: 30 hours

ECTS credits

5

The academic cycle

2022/2023 winter semester

Type of course

obligatory

Language of instruction

english

Teaching methods

- discussion
- multimedia-based lecture
- problem solving
- problem-focused lecture
- text analysis and discussion

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

Final evaluation

- Graded credit
- Examination

Assessment methods

- written exam with open questions
- (mid-term / end-term) test
- written exam (test)
- written exam (long written answer/problem solving)
- oral exam

The basic criteria for evaluation

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

Method of verifying required learning outcomes

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

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 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

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)

Contact

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