Elements of theoretical physics I - course description

General information

Course name	Elements of theoretical physics I
Course ID	13.2-WF-FizD-ETP-S18
Faculty	Faculty of Physics and Astronomy
Field of study	Physics
Education profile	academic
Level of studies	Second-cycle studies leading to MS degree
Beginning semester	winter term 2021/2022

Course information

Semester	1
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Class	30	2	-	-	Credit with grade

Aim of the course

The course provides an introduction to the conceptual and mathematical foundations of modern theoretical physics, with a particular emphasis on analytical mechanics and relativity.

Prerequisites

Knowledge of foundations of physics and mathematics corresponding to educational level undergraduate

Scope

Mathematical methods in Theoretical Physics: differential equations, the scalar and vector fields, foundations of analytic functions theory.
Classical dynamics. Newton's laws: space and time, mass and force, the first and the second laws - intertial frames and noninertial frames. Systems with variuos resistance. Systems with varying mass.
Elements of the variational methods. Euler-Lagrange equations and applications. Constrained systems.
Symmetries and conservation laws, the Hamiltonian formulation of classical physics.

Teaching methods

Conventional lectures and classes.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Student can find on his/her own special teaching materials concerning theoretical physics problems in Polish and English.	• K2_W06 • K2_U10 • K2_U11	• a discussion • activity during the classes	• Class
Skill of theoretical interpretations known experimental physics facts and using mathematical methods and methods of theoretical physics to solve problems and to describe the processes occurring in nature. Understanding the role of mathematics in physics.	• K2_W01 • K2_W02 • K2_U03	• activity during the classes • an evaluation test • an exam - oral, descriptive, test and other	• Lecture • Class

Assignment conditions

Lecture: The exam.
Class: the test-work.

Final score: (50%) exam score + (50%) classes score.

Recommended reading

[1] L. D. Landau, E. M. Lifshitz, Course of Theoretical Physics, Pergamon Press.
[2] F. Scheck Mechanics: From Newton's Laws to Deterministic Chaos, Springer 2003.
[3] J. R. Taylor, Classical Mechanics, University Science Book, 2005

Further reading

[1] I. Arnold, Metody matematyczne mechaniki klasycznej, PWN, Warszawa 1981.
[2] H. Goldstein, C. Poole, J. Safko, Classical mechanics, Pearson New International Edition, 2013

Notes

Modified by dr Marcin Kośmider (last modification: 09-05-2021 21:34)