Classical and relativistic mechanics - course description

General information

Course name	Classical and relativistic mechanics
Course ID	13.2-WF-FizP-CRM-S17
Faculty	Faculty of Physics and Astronomy
Field of study	WFiA - oferta ERASMUS
Education profile	-
Level of studies	Erasmus programme
Beginning semester	winter term 2023/2024

Course information

Semester	2
ECTS credits to win	6
Available in specialities	Physics
Course type	obligatory
Teaching language	english
Author of syllabus	• prof. dr hab. Krzysztof Urbanowski

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
Class	30	2	-	-	Credit with grade
Lecture	30	2	-	-	Exam

Aim of the course

Familiarize students with formalism and the theory of classical mechanics and relativistic and manufacturing of physical problem-solving skills in this area.

Prerequisites

Skills acquired during the previous course of study: basic physics, algebra and mathematical analysis.

Scope

- Kinematics and dynamic of point-mass systems and rigid bodies.

- Constraints, d'Alembert principle, Lagrange equations.

- Variational methods and conservation laws. Noether theorem.

- Phase space, Hamilton equations. Canonical invariants, integrals of motion.

- Galilean space-time. Minkowski space-time and special relativity theory.

- Elements of the relativistic dynamics.

- Elements of the continuous media mechanics.

Teaching methods

Conventional lecture and classes.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Skills acquisition process description with the use of the classical mechanics. The ability to correctly formulate the problem associated with the analysis of the physical model in order to apply appropriate methods of theoretical mechanics. Student has a general knowledge of the physics of classical and modern physics, physical measurement methods and astronomy, which allows for the understanding of fundamental physical phenomena of the surrounding world, he knows the cause and effect relationship. The student is able to create a theoretical model of the phenomenon and associate it with the results of measurements. The student can use the formalism of classical mechanics to describe simple physical phenomena, is able to analyze and solve problems on the basis of physical knowledge and information from the available literature sources, databases and Internet resources. The student can independently acquire knowledge and develop their skills, using a variety of sources (in Polish and foreign) and new technologies. The student is aware of this knowledge and skills, and understands the need to know the possibilities of continuous further training .		• a quiz • an exam - oral, descriptive, test and other	• Lecture • Class

Assignment conditions

Lectures: passing a final written exam,

Classes: passing a final test.

Final grade: weighted average of exam grades (60%) and classes grade (40%).

Recommended reading

[1] I. Olchowski, Mechanika teoretyczna, PWN, Warszawa 1978.
[2] W. Garczyński, Mechanika teoretyczna, Wrocław 1978.

Further reading

[1] W. Rubinowicz, W. Królikowski, Mechanika teoretyczna, Wydawnictwo Naukowe PWN, Warszawa 1998.
[2] L. D. Landau, J. M. Lifszyc, Mechanika, Wydawnictwo Naukowe PWN, Warszawa 2007.
[3] J. R. Taylor, Mechanika klasyczna, Wydawnictwo Naukowe PWN, Warszawa 2006.

Notes

Modified by dr Marcin Kośmider (last modification: 06-02-2023 22:53)

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