COURSE DESCRIPTION CARD - SYLLABUS

Course name
Aspects of the physics of the XXI century [N2Trans1>AFXXIw]

Course

Field of study
Transport

Year/Semester
1/1

Area of study (specialization)
Railway Transport

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
9

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

dr inż. Łukasz Majchrzycki
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Prerequisites

Basics of mathematics, chemistry and physics, Using literature (textbooks, internet), the ability to perceive lecture content, Awareness of the need to deepen engineering knowledge and its place in everyday life

Course objective

Providing students with basic knowledge of the physical aspects of the functioning of the world around us in the scope defined by the curriculum content appropriate for the field of study.

Course-related learning outcomes

Knowledge:
Student has ordered and theoretically founded general knowledge related to key issues in the field of transport engineering

Skills:
Student is able to plan and conduct experiments, including measurements and simulations, interpret the obtained results and draw conclusions, as well as formulate and verify hypotheses related to complex engineering problems and simple research problems

Student is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems

Social competences:
Student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Written credit based on orally asked questions. In case of doubts related to the assessment, an oral exam is allowed.

Programme content

1. The development of research on the structure of matter
2. Properties of the nucleus
3. The process of disintegrating the atomic nucleus
4. Ways of obtaining energy in the process of breaking down the atomic nucleus (nuclear energy)
5. Project Manhattan
6. Other uses of alpha, betha, gamma radiation

Course topics

Developments in research on the structure of matter,
Properties of the atom and atomic nucleus,
The most important physical experiments in the field of the structure of matter,
Electromagnetic radiation - ranges and applications,
Alpha, beta, and gamma radiation,
Nuclear binding energy, stability of atomic nuclei,
Obtaining energy in the process of nuclear fission,
Construction of nuclear reactors,
Application of radioactive sources in technology and medicine,
Optical and confocal microscopy in technical applications,
Research methods of electron microscopy (SEM, TEM),
Methods of scanning probe microscopy (STM, AFM).

Teaching methods

Multimedia presentation

Bibliography

Basic
1. Paul. A. Tipler - Fizyka współczesna
2. Jerzy Ginter - Wstęp do fizyki atomu, cząsteczki i ciała stałego
3. Nuclear Power, Understanding the Future, Bertrand Barre
Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	9	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	21	0,50