



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aspects of 21st century physics [S2MiBP1E>AFXXIw]

Course

Field of study	Year/Semester
Mechanical and Automotive Engineering	1/1
Area of study (specialization)	Profile of study
Product Engineering	general academic
Level of study	Course offered in
second-cycle	English
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	0	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

1,00

Coordinators

dr hab. Arkadiusz Ptak prof. PP
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Lecturers

Prerequisites

Knowledge: Basics of mathematics, chemistry and physics. Skills: Using literature (textbooks, internet), the ability to perceive lecture content Social competences: 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

- 1.The student ought to acquire field specific vocabulary related to manufacturing techniques as well as repairs and maintenance and to be able to define and explain associated terms, phenomena and processes.
2. The student ought to acquire field specific vocabulary related to disc brakes and to be able to define and explain associated terms, phenomena and processes.
3. The student ought to acquire field specific vocabulary related to central heating and to be able to

define and explain associated terms, phenomena and processes.

4. The student ought to acquire field specific vocabulary related to recycling and to be able to define and explain associated terms, phenomena and processes.

Skills

1. The student is able to give a talk on field specific or popular science topic (in English), and discuss general and field specific issues using an appropriate linguistic and grammatical repertoire.

2. The student is able to formulate a text in English where he/she explains/describes a selected field specific topic.

3. The student is able to understand and analyze international, field specific literature.

4. The student has already acquired language skills compatible with level B2 (CEFR).

Social competences

1. The student is able to communicate effectively in a field specific/professional area, and to give a successful presentation in English.

2. The student is able to recognize and understand cultural differences in a professional and private conversation, and in a different cultural environment.

Methods for verifying learning outcomes and assessment criteria

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

Physics as a fundamental integrating natural and technical sciences.

Modern knowledge of the structure of matter.

Quantum technologies and nanotechnologies.

Challenges of contemporary physics.

Course topics

1. Introductory lecture – the essence of physics as an exact and natural science.

2. Physical quantities and units – new definitions (from 2019).

3. The conservation laws from a contemporary perspective.

4. Ideas of quantization, quantum physics, quantum engineering, quantum computers.

5. Structure of matter – from elementary particles to the universe.

6. How to see invisible – imaging at the nanoscale; nanoscience and nanoengineering.

7. Discussion on hot topics in modern physics.

Teaching methods

Lecture with multimedia presentation

Bibliography

1. Paul. A. Tipler - Fizyka współczesna

2. Jerzy Ginter - Wstęp do fizyki atomu, cząsteczki i ciała stałego

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50