COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1Elmob1>Fiz1]

Course

Field of study
Electromobility

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

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Prerequisites

Student starting this course should have the basic knowledge in physics and mathematics (secondary school, basic level). The ability of solving the elementary problems in physics based on the possessed knowledge, as well as the ability to obtain additional information from the indicated literature sources, is required. Student should also be aware of the need to expand their competences and be ready to cooperate as part of the team.

Course objective

1. Transfer of knowledge about fundamental basic concepts and laws in the field of classical physics, with an emphasis on applications in technical sciences. 2. Developing students" ability to solve problems in the field of physics, and seeing its potential applications in the studied field. 3. Development of skills in self-study and team work.

Course-related learning outcomes

Knowledge:
1. Student has advanced knowledge in physics necessary to understand the basic physical phenomena occurring in the elements and systems of electromobility; knows the properties and understands the necessity to use various materials.

Skills:
1. The student is able to use literature sources, integrate the obtained information, evaluate and interpret them and draw conclusions in order to solve complex and unusual problems in the field of electromobility.
2. The student is able to plan and carry out experiments, including measurements of basic measurable quantities, which are characteristic for electromobility, in typical and not fully predictable conditions; is able to present the obtained results in numerical and graphic forms, interpret them and draw appropriate conclusions.

Social competences:
1. The student understands the importance of knowledge in solving problems in the field of electromobility; is aware of the necessity to use the experts" knowledge when solving engineering tasks beyond their own competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lectures: written or oral test based on open questions, where student should explain selected physics issues. Passing threshold: 50% of points.
Math exercises: Colloquium where the student"s knowledge of solving of physical tasks is checked (in particular proper physical formula application, logical line of thinking, mathematical efficiency in formula calculations also with numerical data and physical units). Passing threshold: 50% of points.

Programme content

1. Classical mechanics: vector calculus; physical quantities; vector description of motion; kinematics and dynamics of movement (including laws of motion, conservation of energy, momentum, angular momentum); work, power, energy; kinetic and potential energy; free, forced and dumped harmonic vibrations (including the phenomenon of resonance).
2. Elements of thermodynamics: the description of ideal and real gases; theory of ideal gas; ideal gas transformations; heat and heat transfer; laws of thermodynamics, thermal machines, Carnot cycle.
3. The gravitational field: Newton"s law of universal gravitation; scalar and vector description of gravitational field; intensity and potential of a gravitational field.
4. Electrostatic interactions: electric charge; Coulomb"s law; scalar and vector description of an electric field; potential and intensity of an electrostatic field; Gauss"s law (applications and examples); electric dipoles.
5. DC circuits: electric current intensity; vector of current density; electric current; Ohm"s law and Kirchhoff"s laws; electric resistance; resistors (series and parallel connection); RC circuits; electrical measuring instruments - ammeter, voltmeter.
6. Basis of analysis of measurement errors and presentation of results: including: types of errors; determination of errors: accidental, systematic and fatal; determination of errors of complex values; plots and linear regression.

Teaching methods

1. Lecture: presented with the use of the multimedia presentations (including: drawings, photos, animations, films), additionally supplemented with examples given on the blackboard and experimental demonstrations.
2. Math exercises: practical exercises relying on common solving of tasks in physics, supplemented in addition with multimedia presentations.

Bibliography

Basic
1. D. Halliday, R. Resnick, J. Walker, Podstawy fizyki t 1-5, PWN, Warszawa 2005

2. K. Jezierski, B. Kołodka, K. Sierański, Fizyka. Zadania z rozwiązaniami t 1-2, Oficyna Wydawnicza Scripta, Wrocław 2007
3. J. Kalisz, M. Massalska, J. Massalski, Zbiór zadań z fizyki z rozwiązaniami t.1-2, PWN, 1987
Additional
1. Samuel J. Ling, Jeff Sanny i William Moebs, Fizyka dla szkół wyższych, Tom I-III, Katalyst Education, Warszawa 2018; darmowy podręcznik dostępny w Internecie w ramach projektu OpenStax: Pobierz za darmo ze strony https://openstax.org/details/books/fizyka-dla-szkół-wyższych-polska
2. J. Massalski, M. Massalska, Fizyka dla inżynierów t.1-2, WNT, Warszawa 2006
3. S. Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007

Breakdown of average student's workload

	Hours	ECTS
Total workload	85	3,00
Classes requiring direct contact with the teacher	47	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	38	1,50