COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1MiBM2>FIZ]

Course

Field of study
Mechanical Engineering

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
15

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

Lecturers

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Prerequisites

Knowledge: fundamental knowledge of physics and mathematics (program basis for high schools, basic level) Skills: skills in solving elementary problems in physics based on the knowledge possessed, ability to extract information from the recommended sources Social competencies: understanding of the necessity of extending one’s competences, readiness to cooperate within a team

Course objective

1. Transfer of fundamental knowledge in physics, within the range defined by the program relevant for the field of study 2. Development of skills in solving elementary problems and performing simple experiments, as well as the analysis of results obtained, based on the knowledge possessed 3. Development of skills in self-study and team work

Course-related learning outcomes

Knowledge:
1. The student can formulate and explain fundamental physical laws, within the range covered by program relevant for the field of study
2. The student can define general restrictions and the range of their applicability, give examples of

their application in phenomena in the surrounding world
3. student can explain the aim and meaning of simplified models in description of physical phenomena

Skills:
1. The student will be able to apply basic physical laws and simplified models to solve simple problems within the scope covered by the range of the field of study
2. The student will be able to plan and perform standard measurements of basic physical parameters, identify and evaluate the factors which disturbance measurements
3. The student will be able to perform qualitative and quantitative analysis of the results of simple physical experiments
4.Student will be able to formulate simple conclusions based on the obtained calculation results and performed measurements
5. The student will be able to use with understanding indicated sources of knowledge (list of basic literature) and obtain knowledge from other sources

Social competences:
1. Understand the need for lifelong learning
2. The student is able to interact and work in a group, taking different roles
3. The student will learn the rules of functioning in accordance to the basic ethical principles

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Rating forming and summarizing:
Lectures: Examination under written test with open questions consists of 7 -10 questions. The rating is based on the number of points scored (0-50% - rating 2.0; 50,1-60% - rating 3,0; 60,1-70% - rating 3,5; 70,1-80% - rating 4,0; 80,1-90% - rating 4,5; 90,1-100% - rating 5,0)
Toturials: credit on the basis of two written tests (in the middle and at the end of the semester) and active participation in classes. At the tests to calculate a total of 3-7 tasks. The evaluation criterion is the total number of points gained by the student (0-50% - 2.0 rating; 50,1-60% - rating of 3.0, 60,1-70% - 3.5 rating; 70,1-80% - Assessment 4.0; 80,1-90% - Assessment 4.5; 90,1-100% - rating of 5.0)
Laboratory: 1. assessment of the knowledge necessary to implement the given problems in a given area of laboratory tasks, evaluation criteria: satisfactory 50.1%-70.0%, good 70.1%-90.0%, very good > 90.1% 2. assessment of the technique and correctness of measurements appropriate for a given laboratory exercise, 3. assessment of knowledge and skills related to the implementation of the exercise task during each class, 4. assessment of the written report: analysis of the results obtained and their measurement uncertainties, accuracy of the conclusions, 5. student's activity and independence, ability to cooperate in a group.

Programme content

1. Classical Mechanics: movements classification; kinematics and dynamics of movement (including laws of motion, conservation of energy, momentum, angular momentum); free and forced harmonic vibrations (including the phenomenon of resonance)
2. Elements of thermodynamics: heat transfer mechanisms, elements of kinetic theory of ideal gas
3. The gravitational field
4. 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.
5. Electrostatic field, including: electric charges, principle of conservation of charge, Coulomb's law, scalar and vector description of the electric field, electrostatic field intensity, Gauss's law - applications, examples, electrostatic potential, electric dipole - properties, behavior in a uniform electric field, capacitors, capacity, connection, role of dielectrics, conservation criteria for gravitational and electric fields,
6. Electric circuits, including: electric current, current density vector, electric current, Ohm's law, resistance, sources of electromotive force, Kirchhoff's laws, electrical measurements - ammeter, voltmeter, description and resistance in alternating currents,
7. Magnetic field, including: Lorentz force and electrodynamic force, charge in a magnetic field, magnetic induction, magnetic field around current-carrying conductors, electromotive force of

induction, Faraday's law of induction,
8. Maxwell's equations, electromagnetic waves, including: Maxwell's equations, conclusions resulting from Maxwell's equations, definition and division of electromagnetic waves, properties of electromagnetic waves,
9. Geometric and wave optics, including: laws of reflection and refraction, lenses, mirrors, simple optical devices, Young's experiment, diffraction grating, polarization,
6. Elements of modern physics

Course topics

none

Teaching methods

The course is conducted in the form of a conventional informative lecture, supported by a multimedia presentation, case studies, blackboard exercises, and physical (mechanical) measurements.

Bibliography

Basic:
1. D.Halliday, R.Resnick, J.Walker, Podstawy fizyki t 1-5, PWN Warszawa 2003
2. K.Jezierski, B.Kołodka, K.Sierański, Fizyka. Zadania z rozwiązaniami t 1-2, Oficyna Wydawnicza
3. J. Kalisz, M. Massalska, J. Massalski, Zbiór zadań z fizyki z rozwiązaniami t.1-2, PWN, 1987
4. St.Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007

Additional:
1. J.Massalski, Fizyka dla inżynierów t.1-2, WNT Warszawa 1980
2. K.Łapsa, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2008
3. H. Szydłowski, Pracownia fizyczna, PWN, Warszawa 2003

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	62	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	38	1,50