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
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

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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 (0-49% - rating 2.0; 50-60% - 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

789 / 5 000
1. Classical mechanics, including: SI system of units, physical quantities, vector description of motion, classification of motions, work, power, energy: kinetic energy, potential energy, conservative and non-conservative forces, kinematics and dynamics of translational motion (including: laws of dynamics, conservation principles), kinematics and dynamics of rotational motion (including: laws of dynamics, conservation principles), free, forced (resonance phenomenon) and damped harmonic vibrations,

mechanical waves.

2. Thermodynamics, including: ideal gas, real gas, ideal gas transformations, equation of state of an ideal gas, zeroth law of thermodynamics, heat, specific heat, heat balance equations, first and second law of thermodynamics, linear expansion of solids, Carnot cycle and other thermodynamic cycles.

Course topics

1. SI unit system, physical quantities.
2. Definition of a vector, vector operations, scalar and vector products – examples.
3. Classification and mathematical description of rectilinear motion.
4. Composition of rectilinear motions.
5. Description of circular motion.
6. Definitions of basic mechanical quantities.
7. Newton's laws of motion for translational motion – examples.
8. Law of conservation of momentum as a vector quantity.
9. Forces in nature.
10. Mechanical energy of bodies.
11. Ideal collisions.
12. Center of mass.
13. Moments of inertia of bodies.
14 Complex motion.
15. Newton’s laws of motion for rotational motion.
16. Law of conservation of angular momentum.
17. Work and power in rotational motion.
18. Statics, conditions of equilibrium.
19. Elastic properties of bodies.
20 Harmonic motion.
21. Ideal gas vs. real gas.
22. Fundamentals of thermodynamics.

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