COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [N1Energ2>Fiz]

Course

Field of study
Power 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
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
20

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

The student in begining should have basic knowledge of physics and mathematics at high school level. He should also have the skills to solve elementary problems in physics based on his knowledge, obtain information from specified sources and be willing to cooperate within a team.

Course objective

Providing students with basic knowledge of physics. Developing skills to solve simple physical problems, perform experiments and analyze measurement results based on knowledge obtained. Self-education and teamwork skills shaped at students.

Course-related learning outcomes

Knowledge:
1. is able to define and explain physical concepts to the extent covered by program content and provide examples of their applications in technology.
2. has basic knowledge in the field of physical measurement and analysis of results.

Skills:

1. is able to work individually and in a team.
2. has the ability to self-study.
3. can perform simple experiments, interpret obtained results and draw conclusions.

Social competences:
1. is able to cooperate within the team and demonstrate co-responsibility for the effects of the work of the team.
2. understands the need and knows the possibilities of continuous training.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: acquired knowledge is verified during a 90-minute written exam (carried out during the exam session) consisting of 8 - 9 open questions, various scores. Passing threshold: 50% of points. Exam issues and auxiliary materials on the basis of which questions are developed are sent to students by e-mail using the university e-mail system.
Laboratory exercises: checking the learning outcomes on the basis of oral or written answers regarding the content of the laboratory exercises (50% pass mark) and written reports. The condition of passing the subject is passing a minimum of 85% of all the exercises planned for the student (positive evaluation of responses and reports).

Programme content

Lecture:
1. Classical mechanics
2. Harmonic motion
3. Wave motion
4. Mechanisms of heat transfer
5. Gravitational field
6. Electromagnetism
7. Optics
8. Basics of quantum physics

Laboratory exercises:
1) Classical mechanics,
2) Vibrating movement,
3) Wave motion,
4) Electromagnetism,
5) Optics.
Analysis of measurement results

Course topics

Lecture:
1. Classical mechanics: classification of movements; kinematics and dynamics of translational and rotational motion (including: principles of dynamics, principles of conservation of energy, momentum, angular momentum)
2. Harmonic motion (free, undamped and damped, forced motion, resonance phenomenon)
3. Wave motion (mechanical waves; basics of acoustics; electromagnetic waves; diffraction and interference phenomena)
4. Mechanisms of heat transfer (conduction, convection, radiation)
5. Gravitational field and outline of general relativity
6. Electromagnetism (electrostatics; electric current; magnetostatics; Lorenz force, electrodynamic force, electromagnetic induction, generalized Ampere's law)
7. Optics (phenomena of reflection, refraction, splitting, interference, diffraction, polarization of light)
8. Basics of quantum physics (particle properties of light)

During the semester, the student performs 13-14 exercises from 24 sets of exercises on topics from various branches of physics, such as:

1) mechanics (determination of the moment of inertia, stiffness modulus, Young's modulus, coefficient of friction, coefficient of linear expansion, coefficient of viscosity),
2) oscillating motion (determination of acceleration due to gravity using mathematical and physical pendulums),
3) wave motion (determination of the speed of sound in air),
4) electromagnetism (determination of the ferromagnetic hysteresis loop, electrodynamic force, Lorenz force, capacitor capacity, examination of thermocouple, transformer, electrical conductivity of conductors and semiconductors),
5. optics (determination of the refractive index, focal lengths of lenses, luminous efficiency of light sources, study of the photoelectric effect, diffraction and interference of light, optical spectra).
Issues related to the development of measurement results: arithmetic mean, standard deviation of the mean, normal distribution, determining the uncertainty of simple and complex measurements, linear regression method, graphical presentation of measurement results.

Teaching methods

Lecture: lecture with multimedia presentation (including drawings, photos, animations, films) supplemented with examples on the board and demonstrations. The content presented on the slides is sent to students after the lecture by e-mail using the university e-mail system.
Laboratory exercises: exercises are performed in pairs, monitoring students' progress on an ongoing detailed reviews of reports by the laboratory leader, discussion of calculations and conclusions.

Bibliography

Basic:
1. Materials for lectures sent to students by the lecturer
2. D.Halliday, R.Resnick, J.Walker, Podstawy fizyki t 1-5, PWN Warszawa 2003
3. S. Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007

Additional:
1. Fizyka dla szkół wyższych - free textbook available on the internet www.openstax.pl
2. C. Bobrowski, Fizyka , PWN PWN 2012

Breakdown of average student's workload

	Hours	ECTS
Total workload	142	5,00
Classes requiring direct contact with the teacher	42	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	100	3,50