COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1Trans1>FIZ]

Course

Field of study
Transport

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
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of physics and mathematics in the field of high school. The ability to solve elementary problems in physics based on the acquired knowledge and the ability to obtain information from the indicated sources.

Course objective

1) To acquaint students with the basic concepts and laws of physics in the field of classical physics, including their applications in technical sciences. 2) Developing students" skills in solving problems in the field of technical physics, recognizing its potential applications in the studied field. 3) Developing teamwork skills in students.

Course-related learning outcomes

Knowledge:
The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems

Skills:

The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions

Social competences:
The student is aware of the importance of knowledge in solving engineering problems, knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to serious loss of health and even life

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:
- written exam aimed at assessing the knowledge of the student on the basis of his explanation of selected issues in physics. Passing threshold: 50% of points. Passing issues on the basis of which the questions are developed will be sent to students by e-mail using the university"s e-mail system.
Accounting exercises:
- substantive evaluation of the method of solving the tasks: correct application of physical laws, l mathematical operability in transforming formulas into general data, correctness of numerical calculations and the ability to prepare a unit calculus. Colloquium of tasks of different difficulty (with different points). Passing threshold: 50% of points.
- current assessment of the student"s activity during classes.

Programme content

1.Classical mechanics,
2.Fluid mechanics;
3.Gravitational interaction:
4.Electrical interaction:
5.Electromagnetic interaction:
6.Geometrical and wave optics.
7.Achievements of modern physics:
8.Issues related to the field of study.

Course topics

1.Classical mechanics:
- vector description of motion, classification of motions,
- work, power, kinetic energy, potential energy, conservative and non-conservative forces,
- Kinematics and dynamics of progressive motion (including: principles of dynamics, principles of conservation),
- kinematics and dynamics of rotational motion (including: principles of dynamics, principles of conservation),
- free, forced (resonance phenomenon) and damped harmonic vibrations,
- mechanical waves.
2.Fluid mechanics;
- basic equations of hydrodynamics
- Hydrodynamics equations for non-viscous liquids
- equations of hydrodynamics for viscous liquids
- basic equation of fluid statics
- equilibrium equation of fluids in a three-dimensional system
- kinematics of fluids -basic concepts
- description of fluid motion
- equation of continuity of a stream. Classification of flows
- steady flow
- Fluid dynamics-Euler's equation of motion.
- Bernoulli's equation
- applications of Bernoulli's equation
- Bernoulli's equation for real fluids
- dynamic equation of motion of a viscous fluid (Navier -Stokes)

- flows in closed conduits. Hagen -Poiseuille's law
- Laminar and turbulent flows. Critical Reynolds numbers
3.Gravitational field:
- Concept of field, law of universal gravitation,
- scalar and vector description of gravitational field.
4.Electric field:
- Coulomb's law,
- scalar and vector description of electric field,
- Gauss's law,
- Conductors of electric current (Ohm's law, Kirchhoff's laws),
- electrical properties of matter,
- concept of capacitance,
- conservation criteria for gravitational and electric fields.
5.pElectromagnetic fields:
- magnetostatics (Gauss's law, Ampere's law, Biot-Savart's law),
- magnetic properties of matter,
- motion of charges in a magnetic field (Lorentz force, electrodynamic force),
- Electromagnetic induction (Faraday's law),
- Maxwell's equations and electromagnetic waves.
6.Optics:
- Geometrical optics (including the laws of reflection and refraction),
- Wave optics (including interference and diffraction).
7.Achievements of modern physics:
- elements of the theory of relativity,
- basics of quantum theory,
- selected elements of atomic, molecular, solid state, nuclear and particle physics
elementary particles.

Teaching methods

Lecture: multimedia presentation, films, animations.
Accounting exercises: task analysis, graphic illustration, practical exercises.

Bibliography

Basic
1)R. Resnick, D. Halliday, Fizyka , t. 1- 5, PWN, Warszawa 2005
2)J. Massalski, M. Massalska, Fizyka dla inżynierów, t. 1-2, WNT, Warszawa 2006
3)MODERN PHYSICS (Modern Physics 4e) Paul A. Tipler and Ralph A. Llewellyn Physics for scientists and engineers Paul M. Fishbane. - 2. ed., extended. - Upper Saddle River, NJ : Prentice Hall, c 1996
4)J. Orear, Fizyka, t. 1- 2, WNT, W-wa 1990
Additional
1.K. Jezierski, B. Kołodka, K. Sierański „Fizyka. Zadania z rozwiązaniami. Cz. 1 – Mechanika”, Oficyna Wyd. Scripta, Wrocław 2000 K.
2.Jezierski, B. Kołodka, K. Sierański „Fizyka. Zadania z rozwiązaniami. Cz. 2 – Termodynamika, elektryczność i magnetyzm, fizyka kwantowa”, Oficyna Wyd. Scripta, Wrocław 1999,
3.Massalski, M.Massalska, Fizyka dla inżynierów t.1-2, WNT, Warszawa 2006
4. e-Fizyka" to internetowy kurs z Fizyki: Wydziału Fizyki i Informatyki Stosowanej AGH i Centrum e - Learningu AGH przeznaczony do samodzielnego studiowania fizyki. Autor: Zbigniew Kąkol i Jan Żukrowski.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	2,00