COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [N1Trans1>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
part-time

Requirements
compulsory

Number of hours

Lecture
18

Laboratory classes
0

Other (e.g. online)
0

Tutorials
9

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

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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, including:
• vector description of movement, classification of movements,
• work, power, kinetic energy, potential energy, conservative and non-conservative forces,
• kinematics and dynamics of progressive movement (including: rules of dynamics, rules of behavior),
• kinematics and dynamics of rotational motion (including: rules of dynamics, rules of behavior),
• free, forced (resonance) and damped harmonic vibrations,
• mechanical waves.
2. Fluid mechanics;
• basic equations of hydrodynamics
• hydrodynamics equations for non-viscous liquids
• hydrodynamics equations for viscous liquids
• basic equation of fluid statics
• equation of fluid balance in a three-dimensional system
• fluid kinematics - basic concepts
• description of fluid movement
• regular stream continuity. Classification of flows
• steady flow
• fluid dynamics - Euler"s equation of motion.
• Bernoulli equation
• application of the Bernoulli equation
• Bernoulli equation for real fluids
• dynamic equation of motion of a viscous fluid (Navier-Stokes)
• flows in closed conduits. Hagen-Pooiseuille Law
• laminar and turbulent flows. Critical Reynolds numbers
3.Gravity action:
• the concept of a field, the law of universal gravitation,
• scalar and vector description of the gravitational field.
4.Electrical interaction:
• Coulomb"s law,
• scalar and vector description of the electric field,
• Gauss"s law,
• electric current conductors (Ohm"s law, Kirchhoff"s laws),
• electrical properties of matter,
• the concept of capacity,
• criteria of conservatism for the gravitational and electric fields.

5.Electromagnetic interaction:
• magnetostatics (Gauss"s law, Ampere"s law, Biot-Savart law),
• magnetic properties of matter,
• movement of charges in a magnetic field (Lorentz force, electrodynamic force),
• electromagnetic induction (Faraday"s law),
• Maxwell"s equations and electromagnetic waves.
6.Optics:
• geometric 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, nuclear and particle physics.
8. Issues related to the field of study.

Course topics

none

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	27	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	63	3,00