COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1MNT1>Fiz]

Course

Field of study
Mathematics of Modern Technologies

Year/Semester
1/2

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
30

Projects/seminars
0

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

knowledge of physics (core cirriculum for secondary schools, basic level) and mathematics core cirri- culum for secondary schools, advanced level); skill of solving elementary problems in physics base on knowledge; skill in obtaining information from indicated literature sources; understanding of the necessity of education in order to obtain appropriate professional qualifications and to perform social roles.

Course objective

- providing to students basic knowledge of physics in the field specified by the content of the curriculum relevant to the field of study: Mathematics of Modern Technologies - developing of skills of mathematical description and interpretation of the observed phenomena in the surrounding world based on the known laws of physics - developing of the ability to solve simple problems in the field of physics on the basis of the obtained knowledge.

Course-related learning outcomes

Knowledge:
• has knowledge in the field of selected issues including classical mechanics, gravitation, vibrational and wave motion, thermodynamics, electricity and magnetism, electromagnetic waves, optics, theory of

relativity and modern physics [K_W06(P6S_WG)];
• knows applications basic laws of physics in the field of selected issues including classical mechanics, gravitation, vibrational and wave motion, thermodynamics, electricity and magnetism, electromagnetic waves, optics, theory of relativity and modern physics to description of phenomena in the surrounding world [K_W06(P6S_WG)].

Skills:
• is able to apply basic laws of physics and simplified mathematical models to solving simple problems in the field including classical mechanics, gravitation, vibrational and wave motion, thermodynamics, electricity and magnetism, electromagnetic waves, optics, theory of relativity and modern physics [K_U12(P6S_UW)];
• is able to recognize, explain and describe mathematically physical phenomena in the surrounding world on the basis theoretical knowledge related to selected issues of physics [K_U02(P6S_UW)];
• is able to use measuring devices in accordance of the instructions in order to determine basic physical quantities and to perform the analysis of obtained data [K_U09(P6S_UW), K_U11(P6S_UW)];
• - is able to present the obtained results in the form of a report using data visualization using specialized terminology [K_U14(P6S_UK)];
• is able to use indicated literature sources with understanding and actively gain knowledge from other sources [K_U15(P6S_UK)].

Social competences:
• is able to actively engage in solving of posed problems, raising his or her professional, personal and social competences [K_K02(P6S_KK), K_K03(P6S_KO)];
• understands the necessity of the critical evaluation of the gained knowledge [K_K01(P6S_KK)];
• is reponsible for relliability of its work and follows ethical rules [K_K04(P6S_KR)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: written exam/oral (during exam session)
• 50,1% - 70,0%;
• 70,1% - 90,0%;
• 90,1% - 100%.
Tutorials: two tests (7th and 14th week of the semester) and evaluation of activity on classes
• 50,1% - 70,0%
• 70,1% - 90,0%
• 90,1% - 100%
Laboratory classes: evaluation of reports prepared from experiments and theorethical knowledge needed to perform them
• 50,1% - 70,0%
• 70,1% - 90,0%
• 90,1% - 100%

Programme content

Update: 01.06.2023r.
Lectures& Tutorials& Laboratory classes:
• classical mechanics
• mechanical vibrations
• waves
• basics of thermodynamics
• electricity and magnetism
• electric current
• basics of electrodynamics
• elements of atomic and nuclear physics
• elements of modern physics

Course topics

Lectures& Tutorials& Laboratory classes:

• kinematics and dynamics of translational motion
• kinematics and dynamics of rotational motion
• work and power, principles of conservation of momentum, angular momentum and mechanical energy
• free, damped, and forced harmonic oscillations(including the phenomenon of resonance)
• elecricity and magnetism (electrostatics, magnetostatics, Faraday's law of induction, Maxwell's equations, motion of charged particle in electric and magnetic uniform field)
• electric current (Kirchoff's laws, constant and alternating currrent circuits);
• waves (including mechanical waves and elements of acoustic, electromagnetic waves, diffraction, interference)
• thermodynamics (laws of thermodynamics, the kinetic theory of gases, energy transfer mechanisms in thermal processes, thermal expansion)
• elements of atomic and nuclear physics (properties of atomic nucleus, energy of nucleus bonding, radioactive decay, fission and fussion of atomic nucleus, biological consequences and applications of nuclear radiation)

Teaching methods

Lectures: multimedia presentation, demonstrations of physical effects;
Tutorials: calculation of tasks using a whiteboard, demonestration of simple physical problems;
Laboratory classes: laboratory exercises according to program of physical laboratory.

Bibliography

Basic:
• W. Moebs, S. J. Ling, J. Sanny, „Fizyka dla szkół wyższych", t. 1-3, Katalyst Education 2018, dostępny online: https://openstax.pl/podreczniki;
• D. Halliday, R. Resnick, (J. Walker), „Podstawy fizyki", t. 1-5, PWN, Warszawa 2003;
• K. Jezierski, B. Kołodka, K. Sierański, „Zadania z rozwiązaniami. Skrypt do ćwiczeń z fizyki dla studentów I roku wyższych uczelni" cz. I i II, Oficyna Wydawnicza Scripta, Wrocław 2009;
• K. Sierański, K, Jezierski, B. Kołodka, „Wzory i prawa z objaśnieniami", cz. 1-3, Oficyna Wydawnicza Scripta, Wrocław 2005;
• S. Szuba, „Ćwiczenia laboratoryjne z fizyki", Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

Additional:
• J. Massalski, „Fizyka dla inżynierów", t. 1-2, WNT, Warszawa 1980;
• R. P. Feynmann R. B. Leighton, M. Sands, „Feynmana wykłady z fizyki", cz. 1.1-3.0, PWN, Warszawa 2014;
• K. Jezierski, K. Sierański, I. Szlufarska, „Fizyka. Repetytorium. Zadania z rozwiązaniami. Kurs powtórkowy dla studentów I roku i uczniów szkół średnich", Oficyna Wydawnicza Scripta, Wrocław 2003;
• J. Kalisz, M. Massalska, J. M. Massalski, „Zbiór zadań z fizyki", PWN, Warszawa 1971.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	75	3,00