COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics

Course

Field of study

Mathematics in Technology

Year/Semester

1/2

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

-0

Tutorials

30

Projects/seminars

-0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

dr inż. Emilia Piosik

Responsible for the course/lecturer:

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Prerequisites

- knowledge of physics (core cirriculum for secondary schools, basic level) and mathematics core cirriculum for secondary schools, advanced level)

- skill of solving elementary problems in physics base on knowledge, skill in obtaining information from indicated sources

- understanding the need for education in order to obtain the relevant qualifications to perform in the future of the profession and 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 in technology

- 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

- she/he 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

- she/he 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

Skills

- she/he 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

- she/he 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

- she/he is able to use with understanding from specified sources of knowledge (e.g. references, databases) and is active in extraction of knowledge from other sources

Social competences

- she/he is able to actively engage in solving of posed problems, raising his or her professional, personal and social competences

- she/he understands the need of the critical assesment of the gained knowlege

- she/he follows the rules of professional ethics, is responsible for the reliability of results obtained in his or her work and their interpretation, and the assessment of work done by others.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: written or/and oral exam (during exam session)

3 50.1%-70.0%,

4 70.1%-90.0%,

5 90.1%-100%.

Tutorials: two tests (in the middle and in the end of the semester) and evaluation of activity on classes

3 50.1%-70.0%,

4 70.1%-90.0%,

5 90.1%-100%.

Laboratory classes: evaluation of prepared reports from performed exercises and theoretical knowledge necessary for their performance

3 50.1%-70.0%,

4 70.1%-90.0%,

5 90.1%-100%.

Programme content

1. Kinematics and dynamics of translational motion (Newton's laws, conservation of energy and momentum including)

2. Kinematics and dynamics of rotational motion (Newton's laws for rotational motion, conservation of angular momentum)

3. Simple harmonic motion, damped and forced oscillations (resonance including)

4. Mechanical waves and elements of acoustics

5. Grawitation

6. Basics of thermodynamics (laws of thermodynamics, the kinetic theory of gases, energy transfer mechanisms in thermal processes, thermal expansion, thermal insulation)

7. Elecricity and magnetism (electrostatics, magnetostatics, motion of charged particle in electric and magnetic uniform field, Faraday's law of induction)

8. Electromagnetic waves and Maxwell's equations

9. Optics (light nature, basics of geometrical optics, wave optics: dispersion, interference, difraction and polarization of light)

10. Structure and electric and magnetic properties of matter (atom models, band theory of solids (metals, semiconductor devices, superconductivity).

11. Elements of nuclear physics (nuclear properties, nuclear binding energy, radioactive decay, nuclear fission, nuclear fusion, biological effects and medical applications of nuclear radiation)

12. Elements of modern physics:

Teaching methods

Lectures: multimedia presentation, demonstrations of physical effects

Tutorials: calculation of tasks using whiteboard, demonestration of simple physical problems

Laboratory classes: laboratory exercises according to program of physical laboratory

Bibliography

Basic

1. W. Moebs, S. J. Ling, J. Sanny, „Fizyka dla szkół wyższych”, t. 1-3, Katalyst Education 2018, dostępny online: https://openstax.pl/podreczniki

2. D. Halliday, R. Resnick, (J. Walker), „Podstawy fizyki”, t. 1-5, PWN, Warszawa 2003.

3. 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.

4. K. Sierański, K, Jezierski, B. Kołodka, „Wzory i prawa z objaśnieniami”, cz. 1-3, Oficyna Wydawnicza Scripta, Wrocław 2005.

5. S. Szuba, „Ćwiczenia laboratoryjne z fizyki”, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

Additional

1. J. Massalski, „Fizyka dla inżynierów”, t. 1-2, WNT, Warszawa 1980.

2. R. P. Feynmann R. B. Leighton, M. Sands, „Feynmana wykłady z fizyki”, cz. 1.1-3.0, PWN, Warszawa 2014.

3. 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.

4. J. Kalisz, M. Massalska, J. M. Massalski, „Zbiór zadań z fizyki”, PWN, Warszawa 1971.

Breakdown of average student's workload

	Hours	ECTS
Total workload	131	5,0
Classes requiring direct contact with the teacher	81	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	50	2,0

[1] delete or add other activities as appropriate