COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technical Physics

Course

Field of study
Engineering Management

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
elective

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials
15

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
dr hab. Magdalena Elantkowska

Faculty of Materials Engineering and Technical Physics

Institute of Material Research and Quantum Engineering

Piotrowo 3, 60-965 Poznań

email: magdalena.elantkowska@put.poznan.pl

Responsible for the course/lecturer:

Prerequisites

Fundamental knowledge of physics and mathematics (program basis for high schools, standard level). Fundamental knowledge of mathematics based on the knowledge possessed . Skills in solving elementary problems in physics based on the knowledge possessed, ability to extract information from the recommended sources. Understanding of the necessity of extending one's competences, readiness to cooperate within a team.

Course objective

Transfer of fundamental knowledge in physics, within the range defined by the program relevant for the

field of study. Development of skills in solving elementary problems, based on the knowledge possessed. Development of skills in self-study and team work.

Course-related learning outcomes

Knowledge

1. Student can define basic physical concepts, within the range covered by program relevant for the field of study, and indicate simple examples of their application in the surrounding world.

2. Student can formulate and explain fundamental physical laws, within the range covered by program relevant for the field of study, define general restrictions and the range of their applicability, give examples of their application in phenomena in the surrounding world.

3. Student can explain the aim and meaning of simplified models in description of physical phenomena.

Skills

1. Student can apply basic laws of physics and simplified models to describe phenomena in the surrounding world, within the range covered by program relevant for the field of study.

2. Student can use, with understanding, the recommended sources of knowledge (basic references list), as well as gain knowledge from other sources.

3. Student has the ability to self-education, among others to improve professional skills.

Social competences

1. Student can get actively involved in solving problems stated, develop and extend his (her) competences unaided.

2. Student can cooperate within a team, fulfill the duties resulting from division of team work, show responsibility for his (her) own work and joint responsibility for the results of team work.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Knowledge provided during the lecture is verified in the form of a written exam in the form of a test.

The test consists of 25 tasks, 5 possible answers to each question and only one answer is correct.

Evaluation criteria:

3.0: 50.1%-60.0%

3.5: 60.1%-70.0%

4.0: 70.1%-80.0%

4.5: 80.1%-90.0%

5.0: from 90.1%

Examples of the task are presented after each lecture.

Tutorials: colloquium.

Evaluation criteria:

3.0: 50.1%-60.0%

3.5: 60.1%-70.0%

4.0: 70.1%-80.0%

4.5: 80.1%-90.0%

5.0: from 90.1%

Additional assessment of student's activity during classes.

Programme content

1. Classical mechanics

- classification of the modes of motion

- kinematics and dynamics of translatory motion (including: laws of dynamics, conservation laws for energy and momentum)

- kinematics and dynamics of rotary motion (including: laws of dynamics, conservation law for angular momentum)

- harmonic oscillations ? simple and driven (including: resonance phenomenon)

- mechanical waves

- gravity interactions

2. Thermodynamics

- temperature, 0 thermodynamics law

- heat and mechanical work, I thermodynamics law

- elements of kinetic theory of gases

- entropy, II thermodynamics law

3. Electromagnetism

- electrostatics (including: Gauss law)

- electric current

- magnetostatics (including: Ampere's law)

- electromagnetic induction (including: Faraday's law)

-electromagnetic waves (including: energy and momentum, polarization)

4 .Optics

- geometrical optics (including: reflection and refraction laws)

- wave optics (including: interference and diffraction)

5. Fundamentals of special relativity

6 .Fundamentals of quantum physics

- quantum nature of light

- wale properties of matter

The content of the auditory classes relate to solving problems in physics from the issues discussed during lectures and presented in detail above.

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given in the presentation and on the board.

2. Solving problems in physics at auditory classes.

Bibliography

Basic

1. D.Halliday, R.Resnick, J.Walker, Podstawy fizyki t 1-5, PWN Warszawa 2003.

2. K.Jezierski, B.Kołodka, K.Sierański, Fizyka. Zadania z rozwiązaniami t 1-2, Oficyna Wydawnicza Scripta, Wrocław 2000.

Additional

1. The OpenStax Handbook available at:

https://openstax.org/details/books/fizyka-dla-szkół-wyższych-tom-1

https://openstax.org/details/books/fizyka-dla-szkół-wyższych-tom-2

https://openstax.org/details/books/fizyka-dla-szkół-wyższych-tom-3

2. J.Kalisz, M.Massalska, J.M.Massalski, Zbiór zadań z fizyki, część I i II, Wydawnictwo Naukowe PWN, Warszawa 1987

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (preparation for auditory classes, preparation for written test, preparation for exam - useing the recommended sources of knowledge) [1]	55	2,0

[1] delete or add other activities as appropriate