COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1Eltech1>Fiz2]

Course

Field of study
Electrical Engineering

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
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge concerning physics and mathematics (program base for secondary school, basic level). Solving elementary physical problems based on acquired knowledge, ability to acquire information from given sources. Understanding of necessity of own competence broadening, readiness to cooperate within group.

Course objective

Transferring to students basic knowledge concerning physics with special emphasis on applications in technical sciences. Developing students abilities to solve physical problems, to perceive potential applications in studied subject, performing experiments and analyzing the results based on acquired knowledge. Developing students abilities of self-education and team work.

Course-related learning outcomes

Knowledge:
Advanced knowledge of the problems within the scope of the course program with special emphasis on their applications in studied subject. Basic knowledge about constructing, principles of working and lifetime of modern engineering systems.

Skills:
Using (with understanding) recommended knowledge sources (catalog data, applications notes) and derive knowledge from other sources for self-education purpose. Carry out and analyze basic physical experiments and measurements on electrical systems with results interpretation and presentation in numerical and graphical forms.

Social competences:
Understanding of role of knowledge in problems solutions and in increasing level of professional, personal and social skills. Ability of logical and enterprising thinking in electrical engineering field.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:
- written exam: 15 test questons + 1 problem issue (choice from several proposed options)
- tests concerning individual lectures
- current evaluation of students activity
Math exercises:
Substantial evaluation of methods of problem solving: proper physical formula application, logical line of thinking, mathematical efficiency in formula calculations also with numerical data and units, capabilities to solve problems using different methods, clarity and aesthetics of task solutions, current evaluation of students activity
Laboratory:
Oral or written verification of students mastering of basic description of observed phenomenon, evaluation of technical and correctness of measurement realization in frame of exercise and written acquisition of results, evaluation of written report: description of result and measurement uncertainties, conclusions validity, clarity and aesthetics of report, evaluation of ability to cooperate within group, current evaluation of students activity

Programme content

The program of the module covers the following contents:

1. Electromagnetic waves
2. Optics
3. Introduction to quantum physics
4. Elements of modern physics (brief overview)

Course topics

Program of the lecture:
1. Electromagnetic waves
including: energy and momentum, generation and propagation of electromagnetic waves, polarization
2. Optics
including: geometrical optics (reflection and refraction laws, mirrors and lenses), wave optics (interference and diffraction)
3. Introduction to quantum physics
including: interaction between electromagnetic radiation and matter, quantum nature of light, wave properties of matter, elementary problems of atomic structure
4. Elements of modern physics (brief overview)
including: selected problems of atomic, molecular, condensed-phase, nuclear and elementary particle physics, selected problems related to the course of study (introduction to quantum computing)

Program of the tutorials:
problems covering the following fields (detailed program contents previously discussed in the lecture):
1. Force field. Gravitational field
2. Electrostatics
3. Magnetism

4. Electromagnetism
5. Selected problems in optics and modern physics

Program of the laboratory classes:
set of exercises covering the following fields:
1. Mechanics (with elements of thermodynamics)
2. Electromagnetism
3. Optics

Teaching methods

Lecture: multimedial presentation including movies and animations, experimental demonstrations
Math exercises: solving problems, discussion of the results
Laboratory: simulations, experiments (also computer-supported)

Bibliography

Basic
D.Halliday, R.Resnick, J.Walker, Fundamentals of Physics, Wiley 2009
OpenStax, Physics, t. 1-3 (collective work) https://openstax.pl/pl/
K.Jezierski, B.Kołodka, K.Sierański, Physics. Problems with solutions, Scripta, Wrocław 2007
Additional
J.Massalski, M.Massalska, Physics for engineers, WNT, Warszawa 2006

Breakdown of average student's workload

	Hours	ECTS
Total workload	107	4,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00