COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1Eltech1>Fiz1]

Course

Field of study
Electrical Engineering

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
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
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 ofprofessional, 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: 25 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

Programme content

The program of the module covers the following contents:

1. Classical mechanics (including translational, rotational, oscillatory and wave motion)
2. Gravitational interactions
3. Introduction to special relativity
4. Thermodynamics
5. Electrostatics
6. Magnetostatics
7. Electromagnetic induction

Course topics

Program of the lecture:
1. Classical mechanics
including: motion classification, work, power, potential and kinetic energy,
conservative and non-conservative forces, kinematics and dynamics of linear and rotary motion (laws of dynamics and conservation rules), harmonic free vibrations, damped vibrations, forced vibrations (resonance), description of periodic processes with vector diagrams, mechanical waves,
2. Gravitational interactions
including: law of universal gravitation,s calar and vector description of gravitational field, introduction to general relativity
3. Introduction to special relativity
4. Thermodynamics
including: temperature, 0th law of thermodynamics, heat, heat conduction, 1st law of thermodynamics, elements of kinetic gas theory, gas processes, entropy, heat machines, 2nd law of thermodynamics
5. Electrostatic interactions
including: Coulomb law, scalar and vector description of electrical field,
Gauss law, electric current (Ohm and Kirchhoff laws), electric properties of the matter, capacitance
6. Magnetostatics
including: Ampere law, Biot-Savart law, magnetic properties of the matter, charge motion in magnetic field (Lorentz force, electrodynamic
force)
7. Electromagnetic induction

including: Faraday law, Maxwell law
8. Maxwell equations

Program of the tutorials:
problems covering the following fields (detailed program contents previously discussed in the lecture):
1. Mechanics
2. Thermodynamics

Teaching methods

Lecture: multimedial presentation including movies and animations, experimental demonstrations
Math exercises: solving problems, discussion of the results

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	110	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00