



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics for Computer Specialists

### Course

Field of study

Computing

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

16

Laboratory classes

Other (e.g. online)

Tutorials

12

Projects/seminars

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr Andrzej Jarosz

Instytut Badań Materiałowych i Inżynierii

Kwantowej, Wydział Inżynierii Materiałowej

i Fizyki Technicznej

Responsible for the course/lecturer:

### Prerequisites

Basic knowledge of physics (the secondary school curriculum, primary level). Knowledge of mathematics (first semester of first-cycle engineering studies level). Skill in elementary physical problem solving, skill in acquiring information from listed sources. Understanding the necessity of personal competence development.

### Course objective

1. Introduction of basic knowledge in physics within the scope of curriculum content specific for the field of study
2. Development of skills in simple problem solving
3. Self-education ability development

### Course-related learning outcomes

Knowledge

1. Student, who has completed the course, is able to define basic physics terms within the scope



of curriculum content specific for the field of study and give simple examples of their application in real world

2. Student, who has completed the course, is able to formulate and explain basic physics laws within the scope of curriculum content specific for the field of study, explain the range of application and give examples of their application to real world problems
3. Student, who has completed the course, is able to explain purpose and importance of simplified models in physical phenomena description

#### Skills

1. Student, who has completed the course, is able to make use of the listed sources of knowledge (basic literature list) and acquire information from other sources
2. Student, who has completed the course, is able to integrate information acquired during participation in the course, from listed literature and other sources as well as to formulate general conclusions within the scope of the course curriculum content
3. Student, who has completed the course, is able to describe simple physical system with the use of analytical methods

#### Social competences

1. Student, who has completed the course, is able to actively involve in solving problems, develop and expand personal competence

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - assessment of knowledge and skills during written examination (knowledge of basic physical terms, practical use of acquired knowledge for simple computational problem solving, ability to explain meaning and application scope of physics laws). Credit threshold: 50% of maximum score.

Classes - assessment of knowledge and skills based on written works score. Assessment of skills in problem solving in the scope of simple physical effects modeling. Credit threshold: 50% of maximum score.

#### Programme content

1. Classical mechanics
  - motion classification
  - kinematics and dynamics of linear motion (including Newton's laws, conservation of energy and linear momentum)
  - kinematics and dynamics of circular motion (including Newton's laws, conservation of angular momentum)
  - elastic properties of solids
  - simple and forced harmonic oscillations (resonance)
  - mechanical waves
2. Fundamental physical forces
  - motion of a particle in gravitational, electric and magnetic field
3. Selected problems concerning constitution of matter



#### 4. Thermodynamics

- temperature, the zeroth law of thermodynamics
- heat and work, the first law of thermodynamics
- elements of the kinetic theory of gases
- entropy, the second law of thermodynamics

#### 5. Electric current

- conduction of solids, liquids and gases
- basic laws concerning passage of electric current

#### 6. Electromagnetism

- generation of magnetic field
- induction (Faraday's law)
- Maxwell's equations, electromagnetic waves

#### 7. The fundamentals of quantum physics

- quantum nature of light
- wave properties of matter

### Teaching methods

Lecture: multimedia presentation during lecture and electronic documents containing presentation content in a condensed form made available to the students via e-mail.

Classes: practical teaching by quantitative and qualitative physical problem solving. Students work for their own and at a blackboard with the help of a teacher.

### Bibliography

#### Basic

1. D. Halliday, R. Resnick, J. Walker, Podstawy fizyki t 1-5, Wydawnictwo Naukowe PWN, Warszawa 2015
2. S.J. Ling, J. Sanny, W. Moebs i in., Fizyka dla szkół wyższych. Tom 1 - 3, OpenStax Polska, [www.openstax.pl](http://www.openstax.pl)

#### Additional

1. J. Massalski, M. Massalska, Fizyka dla inżynierów t.1, Wydawnictwa Naukowo-Techniczne, Warszawa 2006
2. J. Massalski, Fizyka dla inżynierów t.2, Wydawnictwa Naukowo-Techniczne, Warszawa 2006



### Breakdown of average student's workload

	Hours	ECTS
Total workload	86	3,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) <sup>1</sup>	56	2

<sup>1</sup> delete or add other activities as appropriate