



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics [S1AiR2>Fiz1]

### Course

Field of study

Automatic Control and Robotics

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

5,00

### Coordinators

dr Andrzej Jarosz

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### Lecturers

### Prerequisites

1.Fundamental knowledge of physics; basic level according to the secondary school syllabus 2.Extended knowledge in mathematics, including differential and integral calculus 3.The ability to think logically, use mathematical tools and use them to solve physics tasks at high school level, the ability to learn comprehension and to obtain information from indicated sources 4.Understanding the need to broaden their competence, willingness to cooperate within the team

### Course objective

1. Providing students with basic knowledge of physics, to the extent specified by the curriculum content appropriate to the field of study 2. Developing students' skills in solving simple problems and performing simple experiments as well as analyzing results based on the knowledge obtained

### Course-related learning outcomes

Knowledge:

1.Student has ordered, theoretically founded general knowledge in selected branches of physics, including general mechanics, acoustics, electricity and magnetism, and optics and elements of modern physics, including the knowledge necessary to understand the basic physical phenomena occurring in

the elements and systems of automation and robotics, and their surroundings [K1\_W1 (P6S\_WG)];  
2. Student is able to define and knows the basic concepts and physical laws and knows simple examples of their application in the surrounding world; has knowledge of the use of knowledge in physics to support the work of an engineer, knows the need to apply physics in engineering and technologies [K1\_W2 (P6S\_WG)];  
3. Student has ordered theoretically founded and general knowledge in the field of general mechanics: kinematics and dynamics, including knowledge necessary to understand the principles of modeling and constructing simple mechanical systems [K1\_W3 (P6S\_WG)];

Skills:

1. Student is able to use the recommended sources of information and understand the contents (list of fundamental literature) and and acquire knowledge from other sources [K1\_U1 (P6S\_UW)];  
2. Student knows how to apply basic physical laws and simplified models in solving simple problems to the extent covered by the curriculum content specific to the field of study [K1\_U11 (P6S\_UW)];

Social competences:

Student able to actively engage in solving the basic problems independently develop and expand their skills [K1\_K1 (P6S\_KK)]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written exam in the form of a single-choice test.

Grading scale (grades assigned to the percentage ranges):

<90–100> very good  
<80–90) good plus  
<70–80) good  
<60–70) satisfactory plus  
<50–60) satisfactory  
<0–50) unsatisfactory

Tutorials: Final test (5 tasks), assessment of activity in the classroom.

Evaluation criteria: each task scored on a scale from 0 to 5 points, the activity in class scored on a scale from 0 to 3 points.

Grading scale (grades assigned to the percentage ranges):

<90–100> very good  
<80–90) good plus  
<70–80) good  
<60–70) satisfactory plus  
<50–60) satisfactory  
<0–50) unsatisfactory

### Programme content

1. Kinematics and dynamics of translational and rotational motion
2. Oscillations and waves
3. Fundamental physical forces - motion of a particle in gravitational, electric and magnetic field
4. Selected problems concerning constitution of matter
5. Thermodynamics
6. Electric current
7. Electromagnetism - electric and magnetic field, induction, Maxwell's equations, electromagnetic waves
8. Geometric and wave optics
9. The fundamentals of quantum physics

### Course topics

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  
 4. Optics: geometrical optics (including: reflection and refraction laws), wave optics (including: interference and diffraction)  
 5. Elements of modern physics: quantum nature of light, photoelectric effect, elementary problems of atomic structure, lasers  
 Tutorials programme: solving problems in mechanics, thermodynamics and electromagnetism

## Teaching methods

Lectures: multimedia presentation, conversation with students

Tutorials: solving problems

## Bibliography

Basic:

1. D.Halliday, R.Resnick, J.Walker, Podstawy fizyki t 1-5, PWN Warszawa 2003
2. K.Jeziński, B.Kołodka, K.Sierański, Fizyka. Zadania z rozwiązaniami t 1-2, Oficyna Wydawnicza Scripta, Wrocław
3. J.Kalisz, M.Massalska, J.M.Massalski, Zbiór zadań z fizyki, część I i II, Wydawnictwo Naukowe PWN, Warszawa 1987

Additional:

1. J.Masalski, Fizyka dla inżynierów t.1-2, Wydawnictwa Naukowo-Techniczne, 2006
2. Openstax - Fizyka dla szkół wyższych  
 tom1: <https://openstax.org/details/books/fizyka-dla-szkół-wyższych-tom-1>  
 tom2: <https://openstax.org/details/books/fizyka-dla-szkół-wyższych-tom-2>  
 tom3: <https://openstax.org/details/books/fizyka-dla-szkół-wyższych-tom-3>

## Breakdown of average student's workload

|   | Hours | ECTS |
|---|-------|------|
| Total workload  | 125   | 5,00 |
| 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) | 78    | 3,00 |