



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

Ewa Chumnicka

Instytut Badań Materiałowych i Inżynierii

Kwantowej, Zakład Inżynierii i Metrologii

Kwantowej

ul. Piotrowo 3

Responsible for the course/lecturer:

dr inż. Emilia Piosik

email: emilia.piosik@put.poznan.pl

tel.: 61 6653326

Wydział Inżynierii Materiałowej i Fizyki

Technicznej

ul. Piotrowo 3

mgr inż. Anna Dychalska

email: anna.dychalska@put.poznan.pl

tel.: 61 6653304

Instytut Badań Materiałowych i Inżynierii

Kwantowej, Zakład Spektroskopii Optycznej

### Prerequisites

1. Basic knowledge of secondary school physics and mathematics



2. Ability to solve elementary problems in physics based on own knowledge and obtaining information from specified sources

3. Understanding the need to broaden own competences and willingness to cooperate within a group

### Course objective

1. Familiarizing students with the basic concepts and physical laws in classical physics, including their applications in technical sciences

2. Developing students skills in solving problems in technical physics, noticing its potential applications in the studied field

3. Familiarization with the elements of the technique of physical measurements and analysis of their results based on the knowledge obtained.

### Course-related learning outcomes

#### Knowledge

1. Has knowledge in mathematics including algebra, analysis, theory of differential equations, analytical geometry and being the basis for understanding issues in the field of physics

2. Has knowledge of physics, including the basics of classical mechanics, optics, electricity and magnetism, solid state physics, thermodynamics, necessary to understand theoretical issues and constructions used in aircraft

#### Skills

1. Is able to use with understanding various sources of knowledge as well as analyze obtained information and draw conclusions from them

#### Social competences

1. Understands the need of critical evaluation of knowledge and is able to independently develop and expand own competences

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written and/or oral exam

Exercises: evaluation of exercises' solutions, final test.

Laboratory: current control of theoretical knowledge and evaluation of reports

### Programme content

- Mechanical waves (wave refraction and reflection, diffraction and interference phenomenon, Doppler effect, basics of acoustics),

- Gravitational interactions,



- Electric field (Coulomb's law, electric field strength and potential, electric field strength work),
- Magnetic field (Lorentz force, electrodynamic force),
- Electromagnetic induction (flux, Faraday's law, Lenz's rule),
- electromagnetic waves (Maxwell equations),
- Basics of fluid mechanics

PART - 66 (THEORY - 22.5 hours, PRACTICE - 11.25 hours)

## MODULE 2. PHYSICS

### 2.4 Optics (light)

Physical properties of light; speed of light;

The laws of reflection and refraction: reflection on a flat surface, reflection through mirrors spherical, refraction, lenses;

Fiber optic technique. [2]

### 2.5 Wave motion and sound

Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves;

Sound: speed of sound, sound production, intensity, pitch and quality, Doppler effect [2]

## Teaching methods

Lecture: multimedia presentation supplemented with examples on the board

Exercises: task analysis and solving on the board (teamwork possible)

Laboratory: student's own work at the measuring stand (practical exercises) under the supervision and with a small help of the teacher

## Bibliography

Basic

1. D. Halliday, R. Resnick, J. Walker, "Podstawy fizyki" t. I - IV, PWN, Warszawa 2005.
2. J. Massalski, M. Massalska, "Fizyka dla inżynierów" t. I, WNT, Warszawa 2006.
3. J. Orear, „Fizyka”, t. 1- 2, WNT, Warszawa 1990.

Additional

1. K. Jezierski, B. Kołodka, K. Sierański, „Fizyka. Zadania z rozwiązaniami. Cz. 1 Mechanika”, Oficyna Wyd. Scripta, Wrocław 2000 K.



2. Jezierski, B. Kołodka, K. Sierański, "Fizyka. Zadania z rozwiązaniami. Cz. 2 Termodynamika, elektryczność i magnetyzm, fizyka kwantowa", Oficyna Wyd. Scripta, Wrocław 1999

### Breakdown of average student's workload

	Hours	ECTS
Total workload	78	3,0
Classes requiring direct contact with the teacher	64	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests) <sup>1</sup>	14	0,5

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