



## 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

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

Ewa Chrzumnicka

Instytut Badań Materiałowych i Inżynierii

Kwantowej, Zakład Inżynierii i Metrologii

Kwantowej

ul. Piotrowo 3

Responsible for the course/lecturer:

dr inż. Przemysław Głowacki

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Wydział Inżynierii Materiałowej i Fizyki

Technicznej

ul. Piotrowo 3

### 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

### 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.

### Programme content

- Material point kinematics (rectilinear and curvilinear motion),
- Material point dynamics (Newton's dynamics principles, friction, momentum, work, power and energy),
- Dynamics of a rigid body (moment of force, moment of inertia, Steiner's theorem, principles of dynamics of rotational motion, angular momentum, kinetic energy of rotation),
- Principles of behavior in mechanics (principle of conservation: angular momentum, angular momentum, energy), collisions of bodies (perfectly elastic and inelastic), rigid body statics,
- Free, forced harmonic vibrations (resonance phenomenon) and suppressed harmonic vibrations,
- Basics of thermodynamics

PART - 66 (THEORY - 22.5 hours)

MODULE 2. PHYSICS

2.1 Matter 1 1 1 1



Physical properties of matter: elements, atomic structure, molecules;

Chemical compounds.

States: solid, liquid and gas;

Changes between states. [1]

2.2 Mechanics

2.2.1 Statics

Forces, moments and pairs, vector representations;

Center of gravity; [2]

2.2.3 Dynamics

a) Mass

Force, inertia, work, power, energy (potential, kinetic and total), heat, efficiency;

b) Momentum, conservation of momentum;

Impulse;

Gyroscopic principles;

Friction: Physical properties and effects, coefficient of friction (rolling friction). [2]

### Teaching methods

Lecture: multimedia presentation supplemented with examples on the board

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

### 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. Cz. Bobrowski, "Fizyka - krótki kurs dla inżynierów", WNT, Warszawa 2004

### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	63	2,5
Student's own work (literature studies, preparation for tutorials, preparation for tests) <sup>1</sup>	12	0,5

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