



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics [S1Lot2>Fiz]

### Course

Field of study

Aviation

Year/Semester

1/2

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

15

Other

0

Tutorials

15

Projects/seminars

0

### Number of credit points

4,00

### Coordinators

dr inż. Anna Modlińska

anna.modlinska@put.poznan.pl

### Lecturers

### Prerequisites

Basic knowledge of physics and mathematics at the secondary school level 2. Ability to solve elementary problems in physics based on existing knowledge and to obtain information from indicated sources 3. Understanding the need to expand one's competences and willingness to cooperate within a team Familiarizing students with basic concepts and physical laws in the field of classical physics, taking into account their applications in technical sciences. 2. Developing students' skills in solving problems in the field of technical physics, noticing its potential applications in the field they are studying.

### Course objective

none

### Course-related learning outcomes

Knowledge:

1. has an extended and in-depth knowledge of mathematics and physics useful for formulating and solving complex technical tasks related to aviation and modeling real problems
2. has knowledge of the method of presenting test results in the form of tables and graphs, performing the

analysis of  
measurement uncertainties

Skills:

1. can use the language of mathematics (differential and integral calculus) to describe simple engineering problems.

Social competence:

1. understands that in technology, knowledge and skills very quickly become obsolete

Social competences:

-

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written exam

Exercises: assessment of solutions to exercises, final colloquium

## Programme content

Mechanics - kinematics and dynamics of a material point, conservation laws in mechanics, free, forced and damped

harmonic vibrations. Fundamentals of gravity

## Course topics

- Kinematics of a material point (rectilinear and curvilinear motion),
  - Dynamics of a material point (Newton's laws of dynamics, friction, momentum, work, power and energy),
  - Dynamics of a rigid body (moment of force, moment of inertia, Steiner's theorem, laws of rotational motion dynamics, angular momentum, kinetic energy of rotational motion),
  - Conservation principles in mechanics (conservation principle: momentum, angular momentum, energy), collisions of bodies (perfectly elastic and inelastic), statics of a rigid body (simple machines),
  - Free, damped and forced harmonic vibrations (resonance phenomenon)
  - Mechanical waves (interference, beats, acoustic waves)
  - Fundamentals of fluid mechanics
  - Fundamentals of thermodynamics
  - Gravity (law of universal gravitation, field intensity and potential), Kepler's laws
- PART - 66 (THEORY - 22.5 hrs., PRACTICE - 11.25 hrs.) MODULE 2. PHYSICS

### 2.2 Mechanics

#### 2.2.1 Statics

Forces, moments and couples, 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]

Lecture: multimedia presentation supplemented with examples on the board

Exercises: analysis of tasks and their solution on the board (teamwork possible) Laboratories: independent performance of experiments and development of results

## Teaching methods

none

## 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	100	4,00
Classes requiring direct contact with the teacher	60	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,00