SYLLABUS

Name: ***Physics (InfAAu>SI2Phys19)***
Name in Polish:
Name in English: ***Physics***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma.polsl.pl/rif/login/index.php

Short description:

The aim of the course is to explain to students the fundamental physical phenomena occurring in the surrounding environment, based on the main physics ideas and concepts. Students will learn the basic laws and principles of both classical and modern physics, along with their mathematical descriptions, in terms of their potential use in technology.

Description:

The course comprises of lectures and problem solving classes. The scope of the lectures includes the following main topics:
- General properties of the physical Universe,
- Fundamentals of kinematics and dynamics of a material point and a rigid body,
- Motion in inertial and non-inertial frames,
- Conservation principles in mechanics,
- Mechanical oscillations,
- Mechanical wave and sound wave propagation,
- Thermal effects including phase transitions,
- Thermal properties of gases and laws of thermodynamics,
- Gravitational field,
- Electrostatic field including dielectric phenomena,
- Magnetic field including electromagnetic induction,
- Electromagnetic radiation and wave optics,
- Quantum optics,
- Atomic structure of matter.

The classes focus on the practical aspects of understanding selected physical phenomena in the surrounding nature through the practical solution of example problems:
Set #1 - Material point: kinematics, dynamics, and conservation principles
Set #2 - Rigid body: kinematics, dynamics, and conservation principles
Set #3 - Mechanical vibrations (oscillations)
Set #4 - Mechanical waves and sound waves
Set #5 - Gas transitions and laws of thermodynamics
Set #6 - Gravitational field
Set #7 - Electrostatic field
Set #8 - Magnetic field and electromagnetic induction
Set #9 - Wave optics and quantum optics
Set #10 - Atomic structure of matter.

ECTS: 5
Total workload: 125 (65 contact hours / 60 student's own work hours)
Lecture: 30 h
Excercises: 30 h
Other (test revision): 5h

Student's own work: preparation for classes, preparation for tests

Bibliography:

Primary
University Physics, W. Moebs, S. J. Ling, J. Sanny, 2016
https://openstax.org/details/books/university-physics-volume-1
https://openstax.org/details/books/university-physics-volume-2
https://openstax.org/details/books/university-physics-volume-3
Optional
M. Mansfield, C. O'Sulivan: Understanding Physics, Wiley and Sons, Inc., New York, 1998.
R. Resnick, D. Halliday, J. Walker: Fundamentals of Physics, Wiley and Sons Inc. New York, 2001.

Learning outcomes:

Knowledge - knows and understands:
-issues in the field of physics, in particular: - basic issues on the general principles of physics, physical quantities, fundamental interactions, issues in the field of material point and rigid body mechanics, oscillatory and wave motion, basics of thermodynamics, electricity, magnetism, optics, quantum physics (K1A_W03)
- issues of physics, electrical engineering and electronics needed to understand digital technology and the principles of operation of modern computers (K1A_W04)

Skills - is able to:
-use the mathematical apparatus learned to describe and analyze basic physical and technical issues, in particular: - is able to perform calculations in vector spaces and use matrix calculus, - is able to use differential and integral calculus in solving problems of physics and technical sciences, - is able to use discrete mathematics methods to describe and analyze finite objects occurring in physical and technical issues (K1A_U07).
- use the learned principles and methods of physics and appropriate mathematical tools to solve typical tasks in mechanics, thermodynamics, electricity, magnetism, optics, and quantum physics (K1A_U13).

Assessment methods and assessment criteria:

The course concludes with a written exam on the common physical effects in the surrounding environment, with an optional oral component.
Admission to the exam requires successful completion of the problem-solving classes.Forms of knowledge assessment:
a) Two problem-solving tests
b) Short tests
c) Participation in class
Total points: 100
- 50 points for the exam. Passing threshold: 25 points (50%).
- 50 points for the problem-solving classes. Passing threshold: 50% for each problem-solving test.
The syllabus is valid from academic year 2025/2026 and its content cannot be changed during the semester.

Element of course groups in various terms:

Course group description	First term	Last term
Informatics S1 semester 2 common subjects (InfAAu>SI2-19-WSP)	2020/2021-L	
Informatics sem. 2 (InfAAu>SI_2)	2024/2025-Z	

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	5	2020/2021-Z	