GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|---|---|---|---|
| Subject name and code | Physics I, PG_00072611 | | | | | | |
| Field of study | Mechanical Engineering | | | | | | |
| Date of commencement of studies | October 2026 | | Academic year of realisation of subject | 2026/2027 | | | |
| Education level | first-cycle studies | | Subject group | Obligatory subject group in the field of study | | | |
| Mode of study | Full-time studies | | Mode of delivery | at the university | | | |
| Year of study | 1 | | Language of instruction | English | | | |
| Semester of study | 1 | | ECTS credits | 4.0 | | | |
| Learning profile | general academic profile | | Assessment form | exam | | | |
| Conducting unit | Division of Automation and Marine Energy -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Małgorzata Śmiałek-Telega | | | | |
| | Teachers | | dr hab. inż. Małgorzata Śmiałek-Telega | | | | |

| Lesson types | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 30.0 | 0.0 | 0.0 | 0.0 | 60 |
| | E-learning hours included: 0.0 | | | | | | |
| | eNauczanie source addresses:<br>Moodle ID: 7313 PG_00072611 Physics I<br>https://enauczanie.pg.edu.pl/2025/course/view.php?id=7313 | | | | | | |

| Learning activity and number of study hours | | | | | |
|---|---|---|---|---|---|
| | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
| | Number of study hours | 60 | 5.0 | 35.0 | 100 |

| Subject objectives | |
|---|---|
| | Student knows fundamentals of Classical and Fluid Mechanics, as well as heat and elements of thermodynamics |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_U06] uses mathematical and physical models to analyze processes and phenomena occurring in mechanical devices | Within this course, students develop the ability to translate real-world physical phenomena occurring in devices into abstract mathematical and physical models. They learn to select appropriate physical laws, formulate equations of motion, and solve them to predict and analyze the behavior of mechanical systems. This acquired skill enables a critical evaluation of machine performance and the optimization of operational parameters based on the modeling results. | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU2] Assessment of ability to analyse information |
| [K6_W01] possesses advanced knowledge of mathematics, physics, and mechanics, applied to the modeling, analysis, and description of phenomena and processes occurring in mechanical systems | The course provides students with an advanced theoretical foundation in physics and associated mathematical tools necessary for describing physical structures and processes. It focuses on delivering structured knowledge that allows for the identification of forces, energies, and kinematic relationships governing material systems. This foundational knowledge is crucial for correctly constructing theoretical models and conducting analytical assessments of the behavior of complex mechanical systems. | [SW1] Assessment of factual knowledge |

## Subject contents

Course content – lecture

1. Jednostki i wektory
2. Wprowadzenie do kinematyki i ruchu pocisków
3. Ruch jednostajny po okręgu
4. Zasady dynamiki Newtona
5. Tarcie
6. Praca i energia
7. Drgania harmoniczne proste
8. Drgania harmoniczne tłumione, drgania wymuszone i rezonans
9. Pęd i zasada zachowania pędu
10. Zderzenia sprężyste i niesprężyste
11. Ruch obrotowy bryły sztywnej, moment pędu i zasada zachowania momentu pędu
12. Równowaga statyczna
13. Fale dźwiękowe
14. Właściwości fizyczne cieczy i gazów
15. Ciepło i elementy termodynamiki

Course content – exercises

1. Units and vectors
2. Introduction to kinematics and projectile motion
3. Uniform circular motion
4. Newton's laws of motion
5. Friction
6. Work and energy
7. Simple harmonic motion
8. Damped harmonic motion, forced oscillations, and resonance
9. Linear momentum and the law of conservation of momentum
10. Elastic and inelastic collisions
11. Rotation of a rigid body, angular momentum, and the law of conservation of angular momentum
12. Static equilibrium
13. Sound waves
14. Physical properties of liquids and gases
15. Heat and elements of thermodynamics

## Prerequisites and co-requisites

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Lecture | 50.0% | 50.0% |
| Exerciscs | 50.0% | 50.0% |

## Recommended reading

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|---|---|
| Basic literature | Halliday, David, Robert Resnick, and Jearl Walker. *Fundamentals of physics*. John Wiley & Sons, 2013. |

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|---|---|---|
| | Supplementary literature | https://openstax.org/details/books/university-physics-volume-1<br><br>https://openstax.org/details/books/university-physics-volume-2 |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | Water is poured into a container that has a small leak. The mass m of the water is given as a function of time t by $m = 5.00t^{0.8} - 3.00t + 20.00$, with $t \geq 0$, m in grams, and t in seconds. (a) At what time is the water mass greatest, and (b) what is that greatest mass? In kilograms per minute, what is the rate of mass change at (c) t = 2.00 s and (d) t = 5.00 s? | |
| Practical activites within the subject | Not applicable | |

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