



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Experimental Physics I

Course

Field of study

Technical Physics

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

45

Laboratory classes

Other (e.g. online)

Tutorials

60

Projects/seminars

Number of credit points

8

Lecturers

Responsible for the course/lecturer:

dr inż. Adam Buczek, prof. PP

adam.buczek@put.poznan.pl

Responsible for the course/lecturer:

dr Aleksander Skibiński

aleksander.skibinski@put.poznan.pl

Prerequisites

1. Basic knowledge concerning physics and mathematics (program base for secondary school, basic level).
2. Solving elementary physical problems based on acquired knowledge, ability to acquire information from given sources.
3. Understanding of necessity of own competence broadening, readiness to cooperate within group.

Course objective

1. Hand over basic knowledge concerning physics with special emphasis on applications in technical fields.
2. Mold students abilities to solve physical problems, doing experiments and analyze results based on acquired knowledge.
3. Develop students abilities within literature study.



Course-related learning outcomes

Knowledge

W01. Mathematical knowledge necessary to description of physical laws and solving physical problems, covering: differenatial and integral equations, linear algebra and analytical geometry [K1_W01].

W02. Orderly and theoretical supported knowledge within mechanics, waves, thermodynamics and gravitation [K1_W03].

Skills

U01. Using mathematical and analytical knowledge to phenomenon description, model and algorithm creation in technical physics field and to form and solve problems also in measurements [K1_U01].

U02. Using (with understanding) recommended knowledge sources: literature, data baze and others. Ability of interpretation, conclusions, form and justification of opinions [K1_U02].

U03. Ability of self-education [K1_U03].

Social competences

K01. Ability to responsible work on appointed tasks, also in group [K1_K01].

K02. Responsibility for work effects, reliability and interpretation of obtained results. Obey professional ethics [K1_K02].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Effect:	Evaluation form:	Evaluation criteria:
W01, W02	Oral / written exam	50.1%-70.0% (3)
U01, U02	Oral / written exam	70.1%-90.0% (4)
	Evaluation of answers	from 90.1% (5)
U01, U02, U03	Written exam	50.1%-70.0% (3)
		70.1%-90.0% (4)
		from 90.1% (5)

K01, K02 Evaluation of activity on math exercises:

Student works strongly supported by teacher, with understanding of acquired knowledge. Is able to solve assigned tasks only in common way. Is not capable to analyze more problems than covered by basic scope of teaching. Demonstrate limited engagement during lessons. (3)

Student works independently, occasionally supported by teacher, with understanding of acquired knowledge. Is able to solve assigned tasks in proper way. Sometimes is capable to analyze more problems than covered by basic scope of teaching. Demonstrate engagement during lessons. (4)



Student works fully independently with deep understanding of acquired knowledge. Is able to solve assigned tasks in ingenious and unconventional way. Is capable to analyze more problems than covered by basic scope of teaching. Demonstrate great engagement during lessons. (5)

Programme content

1. Mathematical knowledge necessary to description of physical laws and solving physical problems:

- Scalars and Vectors,
- Symbolic Calculations,
- Differentiatial and Integral Equations,
- Operator Calculations,

2. Mechanics:

- Units and Measurement,
- Motion Along a Straight Line,
- Motion in Two and Three Dimensions,
- Newton's Laws of Motion,
- Applications of Newton's Laws,
- Work and Kinetic Energy,
- Potential Energy and Conservation of Energy,
- Linear Momentum and Collisions,
- Fixed-Axis Rotation,
- Angular Momentum,
- Static Equilibrium and Elasticity,
- Fluid Mechanics,

3. Waves and Acoustics:

- Oscillations,
- Waves,
- Sound,

4. Thermodynamics:

- Temperature and Heat,
- The Kinetic Theory of Gases,
- The First Law of Thermodynamics,
- The Second Law of Thermodynamics,

5. Gravitation:

- Newton's Law of Universal Gravitation,
- The Gravitational Field,
- Kepler's Laws of Planetary Motion,
- Einstein's Theory of Gravity.



Teaching methods

Lecture: multimedial presentation, movies, animations.

Math exercises: practical exercises, numerical simulations.

Bibliography

Basic

D.Halliday, R.Resnick, J.Walker: Fundamentals of Physics, Wiley 2015

E-learning Moodle course: Physics without risk. Available under address:

<https://moodle.put.poznan.pl/>

on category WIMiFT

B. Fabiański, Z. Paczkowski: Zbiór zadań z fizyki, Warszawski Dom Wydawniczy 2000

J. Araminowicz: Zbiór zadań z fizyki, PWN 1998

A. Hennel, W. Krzyżanowski, W. Suszkiewicz, K. Wódkiewicz: Zadania i problemy z fizyki t. 1, PWN 1974

Additional

Online literature: Universty PHYSICS, OPENSTAX. Available under adress:

<https://openstax.org/subjects/science>

Breakdown of average student's workload

	Hours	ECTS
Total workload	195	8,0
Classes requiring direct contact with the teacher	111	5,0
Student's own work (literature studies, preparation for math exercises, preparation for tests/exam) ¹	84	3,0

¹ delete or add other activities as appropriate