



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics with elements of optics [S1IŚrod1>FzEO]

### Course

Field of study

Environmental Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

30

Projects/seminars

0

### Number of credit points

4,00

### Coordinators

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### Lecturers

### Prerequisites

Student has knowledge of physics and mathematics (core curriculum for secondary schools, basic level). Student is able to solve elementary problems in physics based on the possessed knowledge, the ability to obtain information from the indicated sources. The student understands the necessity of education in order to obtain qualifications appropriate for the future profession and performing social functions.

### Course objective

Provide students with basic knowledge of physics, within the scope defined by the content and curriculum appropriate for the field of study Environmental Engineering. Developing students' skills in solving simple problems in the field of physics and analyzing the results based on the acquired knowledge. The ability to interpret the observed phenomena in the surrounding world based on the learned laws of physics and their practical use. Acquaintance students with the basic methodology of physical measurements and interpretation of real measurement results through the construction of simple mathematical models based on physical laws and theories. Developing students' teamwork skills.

### Course-related learning outcomes

Knowledge:

As a result of the conducted classes, the student:

1. has knowledge of selected issues from classical mechanics.
2. knows the application of the basic laws of physics to describe phenomena in the surrounding world.

Skills:

As a result of the conducted classes, the student:

1. is able to apply the basic laws of physics and simplified models to solve simple problems.
2. can plan, carry out simple measurements, analyze and document the results of research on physical phenomena, assess the importance of the basic factors disturbing the measurement.
3. can use the understanding of the indicated sources of knowledge (list of basic literature) and is active in acquiring knowledge from other sources.
4. has the ability to self-study.

Social competences:

As a result of the conducted classes, the student:

1. are aware of how necessary it is to obey the principles of professional ethics, being a result of the social role of technical university graduate.
2. are aware of responsibility for taking decision.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during lectures is verified by means of a written exam consisting of 20 questions. The possibility of obtaining additional points for the activity in the classroom.

Passing threshold: 50%

Skills acquired during tutorials are verified on the basis of written tests during the semester, homeworks and the direct activity during the classes. Passing threshold: 50%

Knowledge and skills acquired during laboratory classes are verified on the basis of an oral or written response from the scope of content performed laboratory exercises and written reports. The prerequisite is to pass a minimum of 85% of the total planned for students exercises (positive assessment of the responses and reports)

### Programme content

Lectures/tutorials : Basics of classical mechanics: kinematics and dynamics of progressive motion (including the principles of dynamics, the principles of conservation of energy and momentum), kinematics and dynamics of rotational motion (including the principles of dynamics, the principle of conservation of angular momentum), geometrical and physical optics.

Laboratory classes :

During the semester the student performs 13-14 exercises out of 24 exercise sets on subjects from various branches of physics such as mechanics, vibrating motion, wave motion, heat, electromagnetism, optics, and modern physics. Learns and practically uses issues related to the development of measurement results: arithmetic mean, standard deviation , normal distribution, determination of uncertainty of simple and complex measurements, linear regression method, graphic presentation of the measurement results. These contents are implemented as part of the student's own work with support during classes and consultations.

### Teaching methods

Lecture: multimedia presentation, presentation illustrated with examples given on the blackboard

Tutorials: tasks illustrating the material presented during the lecture, solving on the blackboard by students or demonstrated by an academic teacher, discussion of the concepts of solving problems proposed by the students.

Laboratory classes : Preparation for laboratory exercises is based on the instructions contained in the scripts. Exercises are performed in pairs, student progress is monitored on an ongoing basis, the laboratory leader reviews reports, discusses calculations and conclusions

### Bibliography

Basic:

1. D. Halliday, R. Resnick, J. Walker, Podstawy fizyki t 1-5, PWN Warszawa 2003
2. K. Jezierski, B. Kołodka, K. Sierański, Skrypt do ćwiczeń z fizyki dla studentów I roku wyższych uczelni Cz 1 i 2, Oficyna Wydawnicza Scripta, 2013
3. A. Hennel, Zadania i problemy z Fizyki, t. 1-3, PWN
4. S. Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007

Additional:

1. Fizyka dla szkół wyższych - darmowy podręcznik dostępny w internecie [www.openstax.pl](http://www.openstax.pl)
2. K. Jezierski, K. Sierański, I. Szlufarska, Repetytorium Zadania z rozwiązaniami, kurs powtórkowy dla studentów I roku i uczniów szkół średnich, Oficyna Wydawnicza Scripta, 2013
3. J. R. Taylor, Wstęp do analizy błędu pomiarowego, PWN, Warszawa 2018

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50