COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physisc Laboratory II

Course

Field of study
Technical Physics

Year/Semester
2/4

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
	90	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr Ewa Chrzumnicka

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Responsible for the course/lecturer:

Prerequisites

1. Classical physics (mechanics, thermodynamics, electricity and magnetism, optics), and elements of atomic physics and solid state physics.

2. Experimental errors calculation, the basic techniques of developing the measurement data, the ability to use a spreadsheet.

3. The ability to use basic measuring instruments (caliper, micrometer, multimeters, oscilloscope.)

Course objective

1. Educate students in the concepts and physical laws in the field of classical physics, including their applications in technical sciences,

2. Develop student’s abilities to solve physical problems, to perceive potential applications in studied subject, doing experiments and analyze results based on acquired knowledge.

3. Develop students' teamwork skills.

Course-related learning outcomes

Knowledge

1. Student knows the techniques of experimental and observational and experimental planning principles in physics.

2. Student has knowledge of the techniques of higher mathematics and numerical techniques to the extent necessary for a quantitative description, understanding and modeling of physical problems of moderate complexity.

3. Student nows in detail the physical description of the studied phenomena or laws.

Skills

1. Student can use modern measurement equipment and plan in detail the course of the experiment.

2. Student can carry out anl analysis of the results of the experiment, determinate the experimental errors, indicate sources of error and suggest a method for reducing or eliminating them.

3. Student is able to develop in different forms and in a clear manner to present the results of measurements.

Social competences

1. Understanding of role of knowledge in problems solutions and in increasing level of professional, personal and social skills.

2. Cooperation within group, fullfilling work duties, take responsibility for the results of both own and team work.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The assessment of eachexperiment include:

1. assessment of activity and independence of the student during the execution of the exercise (30%),

2. assessment of written reports on the performed exercise (30%),

3. evaluation of an oral colloquium checking knowledge and understanding of the student's physical description of the studied phenomenon and the details of the experiment and acquired skills in the development and analysis of the results (40%).

4. Final rating is the arithmetic mean of the individual exercises.

Programme content

1. Study of mechanical and electromagnetic harmonic vibrations

2. Study of thermoelectric phenomena

3. Checking Malus law and study the linear electro-optic effect - Pockels effect
4. Study the direct and the reverse piezoelektric effect
5. Study of the properties of ferroelectric crystals
6. Preparation of metal-semiconductor junction by means of vacuum evaporation
7. Semiconductor lasers

Teaching methods

Student centered teaching: students perform during the cycle 2 laboratory periments in various fields of physics. Under the guidance of a teacher conducting the exercise to deepen their knowledge about the phenomenon which is the subject of the experiment, prepare a set of experimental measurements determine the detailed plan, perform an experiment, develop and carry out the results of their critical analysis.

Bibliography

Basic

1."II Pracownia Fizyczna" pod red. M.Bertrandt, Wydawnictwo Politechniki Poznańskiej, Poznań 2008

2. D.Halliday, R.Resnick, J.Walker., Podstawy fizyki, t. 1 – 5, PWN, Warszawa 2003

3. J . Massalski, M. Massalska, Fizyka dla inżynierów, t. 1-2, WNT, Warszawa 2006

4. MODERN PHYSICS (Modern Physics 4e) Paul A. Tipler and Ralph A. Llewellyn Physics for scientists and engineers Paul M. Fishbane. - 2. ed., extended. - Upper Saddle River, NJ : Prentice Hall, c 1996

Additional

1. R.P.Feynman, R.B.Leighton, M.Sands, Feynmana wykłady z fizyki, PWN, Warszawa, 1970

2. Ch. Kittel, W. D. Light, M. A. Ruderman, Mechanika, PWN, Warszawa 1969

3. E. M. Purcell, Elektryczność i magnetyzm, PWN, Warszawa 1971

4. F. Ratajczak, Optyka ośrodków anizotropowych , Warszawa, Wydawnictwo Naukowe PWN 1994.

5. B. Ziętek, Optoelektronika, Toruń ,Wydawnictwo Uniwersytetu im. M. Kopernik 2005.

6. E.R. Mustiel , E. R. Parygin., Metody modulacji światła, Warszawa, Państwowe Wydawnictwo Naukowe 1974.

7. A. Chełkowski , Fizyka dielektryków, Warszawa, Wydawnictwo Naukow0-Techniczne 1993.

8. H. Abramczyk , Wstęp do spektroskopii laserowej, Warszawa, Państwowe Wydawnictwo Naukowe 2000.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	60	1,5
Student's own work (literature studies, preparation for laboratory exercises, preparation for tests) [1]	30	1,5

[1] delete or add other activities as appropriate