COURSE DESCRIPTION CARD - SYLLABUS

Course name
New materials for optoelectronics

Course

Field of study
Technical Physics

Year/Semester
3/6

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
prof. dr hab. Danuta Wróbel

danuta.wrobel@put.poznan.pl

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of experimental physics, molecular materials, quantum mechanics, mathematical apparatus. The ability to solve problems in physics at the level of experimental physics, atomic physics, quantum mechanics, the ability to obtain information from indicated sources. Understanding the need to expand one's competences, readiness to cooperate as part of a team, understanding the need to cooperate with other students, understanding the need to make decisions for the benefit of the academic community.

Course objective

1. Presenting students with knowledge of new materials for selected applications in optoelectronics.

2. Acquainting with the types and physical and photophysical properties of modern materials.

3. Presentation of potential applications of materials and perspective.

Course-related learning outcomes

Knowledge

As a result of the conducted classes, the student:

1. can characterize materials for optoelectronics, their physical and photophysical properties [K1_W12]

3. knows the current state of knowledge, the degree of advancement and application of materials and is aware of the latest development trends in optoelectronic materials - [K1_W13]

4. knows the need to use materials for environmental protection - [K_W16]

5. has basic knowledge necessary to understand social and economic new materials - [K_W16]]

Skills

As a result of the course, the student should demonstrate skills in the following areas (the student will be able to):

1. define the processes that occur in new materials and their importance for nanotechnology, characterize the material properties and parameters and the way of their use in modern nanotechnologies and natural sciences (organic and inorganic optoelectronics, organic photovoltaics) _ [K1_U01]

2. assess the positive features of materials (positive and disadvantages) for their potential laboratory and technological applications - [K1_U18]

3. use the understanding of the indicated sources of knowledge (list of basic literature) and gain knowledge from other sources - [K1_U02]

Social competences

As a result of the course, the student will acquire the competences listed below. Completing the course means that:

1. the student is able to work with other students and in the future in the professional team, understands the need to formulate and provide the society with information and opinions on the achievements of technical physics, including the physics of new materials and other aspects of engineering activities - [K1_K01]

2. understands the importance of modern materials in the development of nanotechnology, its use and the general development of civilization and society. - [K1_K09].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Effect	Form of evaluation	Evaluation criteria
W01, W02, W03	Assessment of the acquired knowledge - examination	50.1% -70.0% (3)
	Assessment of participation and activity in lectures	70.1% -90.0% (4)

from 90.1% (5)

Programme content

1. Ancient and modern light sources

2. LED, OLED - properties

3. Photovoltaic cells

4. Carbon materials - graphene, carbon nanotubes, nanocorns, fullerenes

5. Quantum dots

6. Organic covalent dyads

7. Perovskites

8. Moletronika

9. Structures, mechanical, optical, electrical and magnetic properties

10. Applications, importance in optoelectronics, medicine, laboratory

11. Perspectives

Teaching methods

Lecture: presentation illustrated with examples given on the board.

Bibliography

Basic

1. Bieżące artykuły naukowe w zakresie najnowszych materiałów (np. Nature, MaterialsToday, Optoelectronics, webside).

Additional

1. Artykuły naukowe Olgi Malinkiewicz, Saule Technologies

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	3,0
Classes requiring direct contact with the teacher	35	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate