



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Optoelectronics

Course

Field of study

Year/Semester

Education in Technology and Informatics

2/4

Area of study (specialization)

Profile of study

practical

Level of study

Course offered in

First-cycle studies

polish

Form of study

Requirements

full-time

elective

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

15

Tutorials

Projects/seminars

15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

Prof. dr. hab. Tomasz Martyński

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Faculty of Materials Engineering and Technical
Physics

Piotrowo street 3, 60-965 Poznan, Poland

Prerequisites

Knowledge of experimental physics and mathematical analysis, The ability to solve simple physical problems based on the possessed knowledge, the ability to obtain information from the indicated sources. Understanding the need to expand your competences, readiness to cooperate as part of the team.

Course objective

1. The aim of the course is getting to know the physical basics of light sources, detectors, LCD, OLED, PLED indicators.
2. Developing students' ability to analyze the results, prepare research reports and present the results publicly and discuss them in a forum.



3. Shaping students' teamwork skills

Course-related learning outcomes

Knowledge

1. Has extensive knowledge of selected optoelectronics devices, principles of operation and basic construction of detectors for the UV-vis and IR range. [K2_W04]
2. Has detailed knowledge of the principles of operation and selected structures of LCD, LED, OLED displays [K2_W05]

Skills

1. can, on the basis of literature, independently analyze the properties of detectors and displays, the scope of their applicability and the optimal selection for the indicated application purposes. [K2_U02]3. Can select standard measuring devices for a specific task - [K1_U14].

Social competences

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Final written examination/oral examination at the end of the semester

Programme content

The wave nature of light:

Light propagation at the dielectric /dielectric and dielectric /metal interface. Basic photometric units.

Light detectors for the UV-vis and IR range:

Physical basis and principle of operation of thermal and photon detectors. Characteristics of photosensitive materials (photoresists). Thermal infrared detectors (Pt100 resistor, thermistors, bolometer and pyrometer). The principle of operation and construction of a vacuum photocell and photomultiplier tube. Photon detectors on p-n junctions (construction of a photodiode and examples of constructions)

Principles of operation of p-n, pin, Schottky, avalanche photodiode, phototransistor and phototriac, MIS structures, CCD matrices.

Displays:

LCD displays, electroluminescent LCD, LED, OLED, PLED, CRT, plasma, e-paper.

Modern sources of light:

Gallium nitride (GaN - gan) - a future light source ("killer of light bulbs")



The principle of operation and examples of LED and OLED structures

Teaching methods

Lecture supported by audiovisual means and demonstrations

Tutorials problems solutions written down on the blackboard and discussion.

Bibliography

Basic

1. D.J. Griffiths, Introduction to Electrodynamics, Cambridge University Press, 2017,
2. K. Booth, S. Hill, The Essence of Optoelectronics, Prentice Hall , 1998,

Additional

A. Billings, Optics. Optoelectronics an photonics, Prentice Hall, 1990

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2
Classes requiring direct contact with the teacher	45	2
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	15	0

¹ delete or add other activities as appropriate