



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Optoelectronics [S2FT2>Opto]

Course

Field of study

Technical Physics

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr Ewa Chrzumnicka

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Lecturers

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 purpose of the course Optoelectronics is to offer students the possibility to get acquainted with issues related to the phenomena and laws of optics, basic applications of modern measurement methods, systems and systems of information acquisition and processing.. 2. Shaping students' teamwork skills.

Course-related learning outcomes

Knowledge:

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

Skills:

1. Student 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. Can select standard measuring devices for a specific task.

Social competences:

The student is able to work independently and in a team on the task set, shows responsibility in this work.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In terms of the methods used to verify the achieved learning outcomes, the following grading thresholds are applied:

50.1-60% - satisfactory;

60.1-70% - satisfactory plus;

70.1-80% - good;

80.1-90% - good plus;

from 90.1% - very good.

The grade is based on an individual written assignment and/or the assessment of an oral response.

Programme content

Optical radiation properties and electro-optical analogies, optical radiation sources, optical radiation receivers, optical fibers.

Course topics

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 and photonics, Prentice Hall, 1990

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00