GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electroluminescent diodes, PG_00031963		
Field of study	Technical Physics		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Physics of Electronic Phenomena -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Waldemar Stampor	
	Teachers	dr hab. inż. Waldemar Stampor	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	4.0	16.0	50

Subject objectives

LED basics and design of LEDs

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W05] Knows the theoretical basis of the functioning of physical scientific equipment.	Knows the physical principles of operation of devices to determine the technical parameters of LEDs	[SW1] Assessment of factual knowledge
[K7_W03] Has general knowledge of current development paths and discoveries in the scope of physics and related fields of science and technology.	Knows physical principles of electroluminescence	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>1. Types of luminescence.

2. From CRTs to OLEDs, or on modern flat panel TV displays.

3. EL diodes - history.

4. Recombination of electron-hole pairs. Radiative and non-radiative transitions

5. LED basics - electrical properties. p-n junction.

6. LED basics - optical properties,

7. Light extraction from EL diodes.

8. Design of LEDS and technical details.

9. EL diodes - photometry and colorymetry.

10. Organic light emitting diodes (OLEDs).

11. White LEDs.

12. EL diodes versus laser diodes..</td></tr>
<tr><td>Prerequisites
and co-requisites</td><td>Basic quantum mechanics.

Introduction to solid state physics.</td></tr>
<tr><td>Assessment methods
and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>written test</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. E.Fred Schubert, Light emitting diodes, Cambridge University Press, Cambridge 2006.

2. M. Schwoerer and H.C. Wolf, Organic Molecular Solids, Wiley VCH, Weinheim, 2007, chapter 11.</td></tr><tr><td>Supplementary literature</td><td>1. Jan Kalinowski, Organic light-emitting diodes, Marcel Dekker, New York 2005.</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr></table></td></tr>
<tr><td>Example issues/
example questions/
tasks being completed</td><td>1. (e-h) pair recombination mechanisms in EL diodes.

2. Parameters which determine quantum EL efficiency.

3. Types of white light generation in EL diodes.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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