GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electroluminescent diodes, PG_00067893		
Field of study	Technical Physics		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
Education level	second-cycle studies	Subject group	Specialty 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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Waldemar Stampor	
	Teachers	dr hab. inż. Waldemar Stampor	

Lesson types

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	3.0	17.0	50

Subject objectives

LED basics and design of LEDs

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W03] demonstrates awareness of current development trends and recent advances in physics-based technologies.	Knows the applications and development prospects of modern EL diodes	[SW1] Assessment of factual knowledge
[K7_W02] possesses advanced, theoretically grounded knowledge in physics and, to an extent appropriate to professional needs, in related scientific or technical disciplines, including applied computer science, applied physics and photovoltaics.	Knows: - the physical basics of the electroluminescence phenomenon, - the structure and principle of operation of EL diodes, - basic technical parameters of EL diodes, - similarities and differences between inorganic and organic EL diodes.	[SW1] Assessment of factual knowledge
[K7_K01] demonstrates readiness for continuous professional development, including updating and critically evaluating knowledge in physics and related fields, and recognising its importance in solving practical and theoretical problems.	Is able to search for and critically analyze information on contemporary technological and technical solutions in the field of light-emitting diodes, is able to comprehensively compare the electroluminescence phenomenon and the photovoltaic phenomenon.	[SK5] Assessment of ability to solve problems that arise in practice

<table>
<tr><td>Subject contents</td><td>Course content – lecture
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></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>Practical activites within the subject</td><td>Not applicable</td></tr>
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