GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Active Electronic Components, PG_00068277		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	first-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	2	Language of instruction	Polish Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Anna Pietrenko-Dąbrowska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	30.0	0.0	0.0	45

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	45	2.0	28.0	75

Subject objectives

Introduction to the operating principles of selected active electronic components (diodes and transistors) and their basic characteristics, as well as providing students with the knowledge necessary for the effective application of these components in electronic circuits.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	The student is able to analyze and design circuits incorporating active electronic components (diodes, transistors) and solve non-standard problems using knowledge of their operating mechanisms based on semiconductor physics.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	The student knows and understands the relationships between the electrical characteristics of electronic components and their properties resulting from semiconductor physics	[SW1] Assessment of factual knowledge
[K6_U12] can analyze the operation of components, circuits and systems related to the field of study, as well as measure their parameters and examine technical specifications, and plan and conduct experiments related to the field of study, including computer simulations and measurements, and interpret obtained results and draw conclusions	The student is able to analyze the operation of active electronic components, perform measurements of their key parameters, interpret the obtained results, and draw conclusions.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task

<table>
<tr><td>Subject contents</td><td>Course content – lecture
1. Fundamentals of semiconductor physics (crystal structure, energy bands, electron and hole concentration, generation and recombination of charge carriers, charge transport).
2. Diode (p-n junction structure, static characteristics, basic parameters, equivalent circuit models, types of diodes and their applications).
3. MOSFET transistor (structure, ideal and real static characteristics, parameters, equivalent models, basic types and applications).
4. Bipolar junction transistor (BJT) (structure, ideal and real static characteristics, parameters, equivalent models, operating configurations, applications in amplification and switching circuits).
5. Basic optoelectronic components (photodiodes, phototransistors, solar cells, light-emitting diodes structure, operating principles, applications).</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of mathematics at the current stage of studies. The student should also have knowledge from relevant areas of physics (mainly electricity) as well as circuits and signals.</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 exam</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. Lecture contents
2. M. Polowczyk, E. Klugmann, Przyrządy półprzewodnikowe, Wyd.PG, 2001
3. W.J. Stepowicz, Elementy półprzewodnikowe i układy scalowe, Wyd. PG, 1999</td></tr><tr><td>Supplementary literature</td><td>1. W. Marciniak, Przyrządy półprzewodnikowe i układy scalone, WNT, 1979
2. A.S. Sedra, K.C. Smith, T.C. Carusone, V. Gaudet, Microelectronic Circuits, Oxford University Press, 2020</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.