



Subject card

Subject name and code	Active Electronic Components, PG_00068277						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2027/2028	
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	
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		prof. dr hab. inż. Anna Pietrenko-Dąbrowska				
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		

Subject contents	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).		
Prerequisites and co-requisites	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.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	100.0%
Recommended reading	Basic literature	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	
	Supplementary literature	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	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Practical activities within the subject	Not applicable		

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